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SOUTH STATION URBAN RENEWAL PROJECT

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AIR QUALITY TECHNICAL SUPPORT DOCUMENT TO THE ENVIRONMENTAL IMPACT REPORT - SOUTH STATION URBAN RENEWAL PROJECT

ERT Document P-1172-1

May 1975

Prepared for

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1. INTRODUCTION

This report describes and documents a comprehensive air quality analysis performed by Environmental Research and Technology, Inc. (ERT) to assess the potential air quality impact of vehicular emissions associated with a multimodal transportation center and parking garage proposed as part of the South Station Urban Renewal Project. The South Station area is situated in the Boston core area and is characterized by concentrated commercial and light industrial activity. Major heavily-travelled traffic arteries such as the Southeast Expressway, the Massachusetts Turnpike and the Central Artery are directly adjacent and accessible to the area. Figure 1-1 delineates the South Station Urban Renewal Project area and its relation to these arteries and downtown Boston.

The proposed facility was evaluated as an indirect source of air pollution since several contaminants of major environmental concern will be generated by motor vehicle traffic attracted to and affected by the proposed facility. The four pollutants with adverse health effects commonly associated with vehicular traffic - carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons (HC), and oxidants (O_x) - were considered in this analysis. Air quality assessments for several project alternatives have been made for the year 1981, the earliest date by which the proposed facility could be completed, and for 1991. These alternatives are outlined in Section 1.4.

1.1 Study Objectives

The specific objectives of the study were:

1. to measure existing background* levels of CO in the South Station area through an ambient air quality monitoring program,
2. to determine from the data obtained in (1) the existing background CO levels in the South Station area, and to project these existing levels for future analysis years,

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*"Background" as defined in this study are CO levels representative of the South Station area, and not specifically related to one source(s) of emissions.

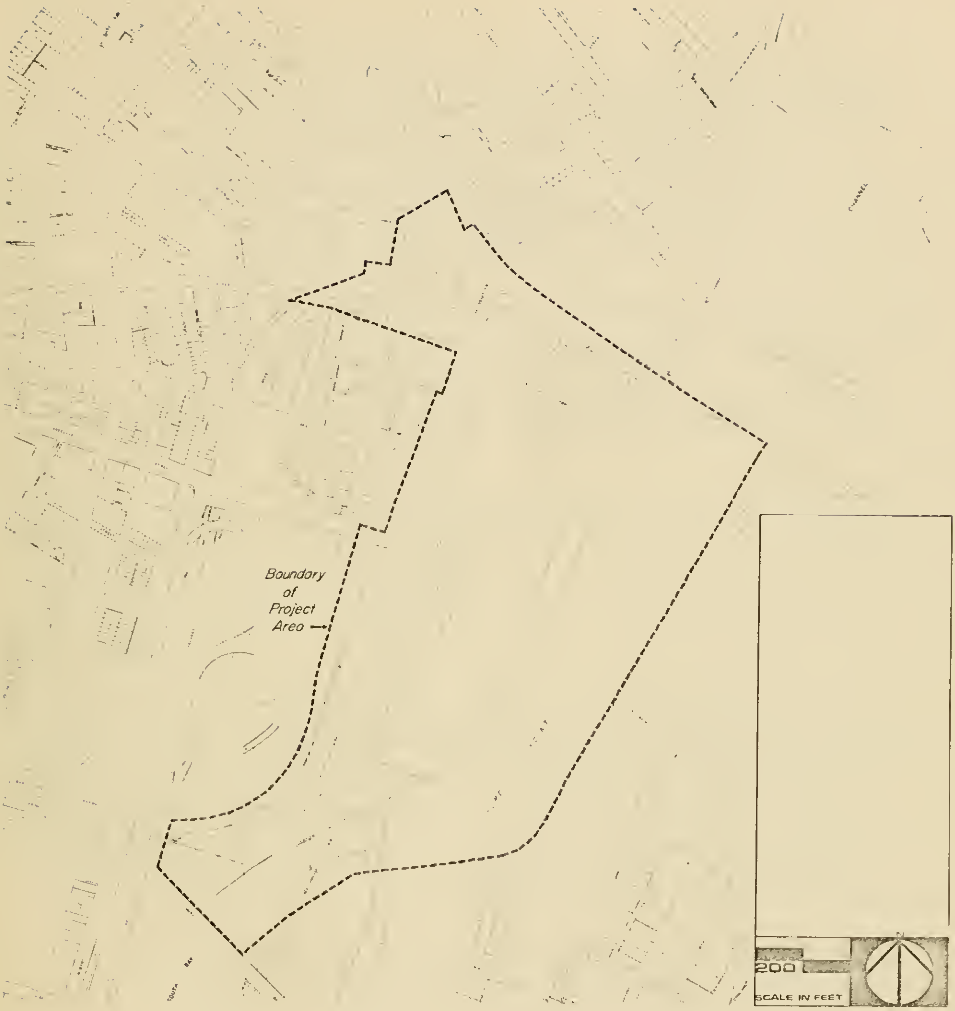

Figure 1-1 South Station Urban Renewal Project Area

FIGURE

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3. to calculate, through dispersion modeling of representative locations in the South Station area, expected total* ambient CO levels resulting from each of the project alternatives,

4. to calculate the relative effect of each alternative on the CO, NO_x, and non-methane hydrocarbon (NMHC) emission burdens in the project area,

5. to evaluate the compatibility of each project alternative with the applicable National Ambient Air Quality Standards (NAAQS) for CO and the Metropolitan Boston Interstate Air Quality Control Region's Transportation Plant to achieve the photochemical oxidant standard,

The technical methodologies employed to accomplish these objectives are documented in the remaining sections of this report and its appendices.

1.2 National Ambient Air Quality Standards and Air Quality Control Strategies

In urban areas, where motor vehicle activity is both extensive and concentrated, the air pollution problem has been extensively documented and is a major environmental concern. Recognizing this fact the U. S. Congress, in the 1970 Clean Air Act Amendments, mandated the Federal Environmental Protection Agency (EPA) to take steps to improve the Nation's air quality. In specific response to this mandate EPA has:

1. Established health-based National Ambient Air Quality Standards (NAAQS) which must be attained and maintained nationwide,

2. Implemented the Federal Motor Vehicle Control Program (FMVCP) to limit emissions from motor vehicles, and

---

*"Total" ambient CO levels are defined as the sum of the dispersion model predictions obtained in (3) and the background levels determined in (2).

3. Developed air quality control strategies to attain and maintain the NAAQS in areas where the FMVCP was found to be inadequate for this purpose.

The National Ambient Air Quality Standards (Table 1-1) have been established for six pollutants. These are: total suspended particulates (TSP), sulfur dioxide (SO_2), carbon monoxide (CO), non-methane hydrocarbons (NMHC), nitrogen dioxide (NO_2), and oxidants. Vehicular traffic is a significant source of only CO, NMHC, and nitrogen oxides (NO_x), and as a result can be directly responsible for high ambient concentrations of CO, NMHC, and NO_2, and indirectly responsible for high concentrations of photochemical oxidants (smog) that result from the photochemical interaction of NO_x and NMHC. Health effects studies have indicated definite adverse impact from both short- and long-term exposure to these pollutants. A complete discussion of their health-related significance is given in Appendix A.

The FMVCP (Table 1-2) has been found inadequate by EPA to attain air quality standards in many urban areas by the required attainment dates. This is the case in the Metropolitan Boston Intrastate Air Quality Control Region (MBIAQCR) where CO and O_x standards are currently exceeded but must be attained by May 31, 1977. Therefore, EPA has proposed a Transportation Control Plan (TCP) to further reduce emissions of CO and NMHC in the MBIAQCR. A complete discussion of the MBIAQCR TCP as it pertains to this project is presented in the following section.

1.3 The Metropolitan Boston Transportation Control Plan

In its proposed MBIAQCR TCP, the EPA has identified a regional oxidant problem and many potential localized CO problems. To attain the CO and O_x standards, EPA has proposed two basic types of control measures to reduce vehicular emissions. These are (1) measures designed to discourage vehicle use and reduce emissions by reducing the number of vehicle-miles traveled (VMT) and (2) measures aimed at reducing emissions per VMT.

VMT-reducing measures include a regional car pooling incentive program and core area parking restrictions. The emission-reducing

TABLE 1-1

NATIONAL AMBIENT AIR QUALITY STANDARDS FOR AUTOMOTIVE POLLUTANTS

(Protective of Human Health)

Pollutant	Level Not to be Exceeded		Averaging Period
Carbon Monoxide	40 mg/m^3*	35 ppm*	1-Hour
	10 mg/m^3*	9 ppm*	8-Hour
Non-Methane Hydrocarbons**	160 $\mu g/m^3$*	0.24 ppm*	6-9 AM
Nitrogen Dioxide	100 $\mu g/m^3$	0.05 ppm	Annual Average
Oxidants (as O_3)	160 $\mu g/m^3$*	0.08 ppm*	1-Hour

*Not to be exceeded more than once each year.

**Promulgated as a guideline standard to be used in developing air quality control strategies to attain the oxidant standard. Not based directly on health-related effects.

TABLE 1-2

LIGHT-DUTY VEHICLE EXHAUST EMISSION STANDARDS REQUIRED BY THE FEDERAL MOTOR VEHICLE CONTROL PROGRAM (FMVCP)

Vehicle Model Year	Emission Standards (grams/vehicle-mile)		
	CO	HC	NO_x
1973, 1974	39	3.4	3.0
1975, 1976	15	1.5	3.1[1]
1977[2]	15	1.5	2.0
1978 and Post-1978[2,3]	3.4	.41	2.0

[1] differences in test procedures account for the apparent increase in allowable emissions.

[2] as of March 5, 1975

[3] EPA has indicated possible modifications to the FMVCP which could delay the implementation of final vehicle emission standards beyond 1978.(1)

measures include the installation of a Vacuum Spark Advance Disconnect (VSAD) or an Air Bleed emission control retrofit device on selected model year vehicles and the implementation of a semi-annual vehicle inspection/maintenance program. A complete description of these control measures can be found in the November 8, 1973, and February 28, 1975, Federal Register(2,3). The effects of the vehicle emission-reducing devices is discussed in Section B.1 of Appendix B.

Due to the concentrated nature of vehicular traffic, CO levels in excess of the standard are generally considered a local rather than regional air quality problem. Many localized CO "hot spots" are suspected throughout the MBIAQCR. These "hot spots" can be defined as those high traffic density areas where the CO standards are currently being exceeded, and are projected to be exceeded on or after the May 31, 1977, attainment date, even with the FMVCP and other control measures proposed in the TCP. EPA proposes to identify these problem areas on a case by case basis, and then to develop and implement appropriate control strategies to insure that air quality standards will be achieved in such areas. Though not explicitly mentioned, the South Station area, with its congested traffic patterns and many street canyons, is expected to be one of these "hot spots" after the implementation of the TCP.

1.4 Description of Alternatives

Quantitative technical assessments have been made for each of three project alternatives and the existing (1974) case (Plan A):

Alternative 1 - The preferred "build" alternative of TAC scheme 18c with a 2500-car capacity garage. (Plan C-2500)

Alternative 2 - The preferred "build" alternative of TAC scheme 18c with a 1000-car capacity garage. (Plan C-1000)

Alternative 3 - A "no build" alternative. (Plan B)

In addition to the above quantitative evaluations, qualitative evaluations have been made with respect to the following:

Alternative 4 - A minimal highway build alternative which excludes the garage and bus terminal ramps to the Southeast Expressway and to the Massachusetts Turnpike. (Plan D)

Alternative 5 - A variation of Alternatives 1 and 2 which includes the construction of a hotel (FAR 10) rather than an office building (FAR 14) on parcel C-5 (see Figure 1-1).

1.5 Air Quality Variables Considered

The magnitude and spatial distribution of ambient air pollutant concentrations exhibit a large degree of variability, corresponding to the many combinations of vehicular emissions, local meteorology and building configurations prominent in the project area. The following sections outline the air quality variables considered in this study.

1.5.1 Vehicular Emissions

Vehicular emissions are determined primarily by the volume, speed and age distribution of the traffic attracted to the South Station area. Since the urban renewal program will alter traffic patterns and flow characteristics, pollutant emissions were determined for the existing (1974) case and each combination of the three project alternatives and two analysis years:

1974 Existing -	Plan A
1981 No Build -	Plan B
1981 Build - 2500	Plan C
1981 Build - 1000	
1991 No Build -	Plan B
1991 Build - 2500	Plan C
1991 Build - 1000	

A complete discussion of the determination of pollutant emissions is given in Section B.1 of Appendix B. In general, higher operating speeds result in lower CO and NMHC emissions and higher NO_x emissions. Also, emissions vary directly with traffic volume - larger traffic volumes produce more emissions - when other determining factors remain unchanged. Lastly, as automotive emission controls become more stringent, and as

the older, uncontrolled vehicles are replaced by newer "clean" ones with more effective pollution controls, unit emissions will decline considerably throughout the foreseeable future.

1.5.2 Local Meteorology

Air quality levels experienced in the urban community are dependent upon the local meteorological conditions which contribute to the transport and diffusion of vehicular emissions. This transport and diffusion is related to the wind direction, wind speed and atmospheric stability occurring in the area at any given moment.

Atmospheric stability is an indirect measure of the level of turbulence in the atmosphere, and is related to the variation of temperature with height. Stability is commonly divided into 3 major categories: unstable, neutral, and stable, which normally follow a diurnal cycle with seasonal variations. However, it is generally accepted that urban core areas do not exhibit the usual early morning periods of stable stability due to what is commonly referred to as the "urban heat island effect".

In summer, the tall buildings, pavement, and concrete of the inner city absorb and store larger amounts of solar radiation than do the vegetation and soil typical of rural areas. Also, less energy is used for evaporation in the city than in the country because of the large amount of run-off of precipitation from streets and buildings. At night, when both the city and countryside cool by radiative losses, the additional heat accumulated by the urban structures during the day keeps the urban air warmer than that of the outlying areas and produces convective turbulence above the city. In the winter, less solar radiation reaches the earth due to the lower sun angle and shorter days, and the heat contributed by man-made sources becomes a significant addition to the solar energy reaching the earth's surface. This heat warms the urban atmosphere and results in increased turbulence in the urban boundary layer. In addition to the turbulence induced by the surface roughness of urban terrain when compared to rural terrain, this "urban heat island effect" is responsible for a preponderance of neutral and unstable stability during the daylight hours in the urban core.

1.5.3 Building Configuration

Pollutants are usually transported in the direction of the prevailing winds. However, the numerous buildings which typify an urban area produce small-scale effects such as "street canyon" vortex formation, wind channeling, and building-induced turbulence which disrupt the normal transport process. Wind tunnel experiments and field studies have indicated that the highest ambient air pollutant concentrations occur in the street canyons formed by the buildings which line both sides of a street. Therefore, it is the formation of these street canyon vortices upon which a major portion of this study will focus. A complete discussion of urban diffusion meteorology and the street canyon phenomena is presented in Sections D.1 and D.2 of Appendix D.

2. STUDY APPROACH

To accomplish the study objectives, a comprehensive "state-of-the-art" air quality impact analysis was performed. The techniques utilized are consistent with those recommended by EPA in their Indirect Source Regulations(4) and have been specifically applied to determine the compatibility of the proposed project with both the National Ambient Air Quality Standards and Federal air quality (MBIAQCR TCP) control strategies to attain these standards. In addition the EPA Region I technical staff was given an opportunity to comment on the study technique at several meetings through the course of the analysis (see Appendix F).

The analytical techniques employed include:

1. Prediction of ambient 1- and 8-hour CO levels in the vicinity of roadways by means of mathematical dispersion modeling,
2. Calculation of project area emission burdens for CO, NMHC, and NO_x to assess the relative impact of the proposed project on a subregional scale and,
3. Compatibility assessment of the proposed project relative to the TCP and regional VMT requirements.

2.1 Modeling the Dispersion of Carbon Monoxide

Dispersion modeling is an analytical tool which mathematically simulates the advection and diffusion of pollutants generated by roadway traffic to yield predictions of roadway-generated CO concentrations. When the model predictions are added to the background levels (levels due to the aggregate of all other sources), the total ambient CO levels within the roadway's area of influence are predicted. The basic inputs into a dispersion model are the roadway emission strength in units of mg/m-sec, as derived from vehicular emission rates (see Appendix B), and meteorological parameters which define the dilution and dispersive capacity of the atmosphere (see Appendix D). For CO, the diffusion model is particularly useful since CO is relatively inert and does not undergo chemical changes which are non-linear and difficult to simulate. Since other chemically-active pollutants such as NMHC and NO_x are involved in the photochemical oxidant formation process, dispersion

modeling has not been developed to a state where its use as a prediction tool is either routine or practical. The development of such models is the subject of intense current research.

The primary dispersion model used in this study is ERT's numerical advection-diffusion model EGAMA. EGAMA represents the current state-of-the-art in dispersion modeling, simulating the adverse micrometeorological effects of obstructions to the wind, such as those caused by buildings and roadway depressions. In particular, the EGAMA submodel CANYON has been specifically developed to simulate the micrometeorological phenomenon produced in urban street canyons, which are known to result in excessive pollutant concentrations within the canyon. To supplement EGAMA, an intergrated area source model based on the work of Gifford and Hanna (1971)(5) has also been employed. This model is used to simulate CO concentrations resulting from winds blowing directly along (parallel to) a roadway. A complete discussion of EGAMA and the Gifford-Hanna model is given in Appendix D. The results of the CO modeling analyses are presented and discussed in Section 4.

2.2 Emission Burden Analysis

The emission burden for a particular roadway link is the product of the roadway link emission strength in units of mass of pollutant per unit roadway length per unit time and the roadway link length. When summed over all links within the project area, the total pollutant burden for the project area is obtained. The technique is particularly useful in showing the relative effects of different project alternatives on a local impact area scale. Since dispersion models cannot routinely handle the intricate chemical interactions of NMHC and NO_x as they are involved in the photochemical oxidation process, the emission burden analysis constitutes an acceptable method for assessing the potential regional or local impact related to these pollutants. The emission burden analysis is presented and discussed in Section 5.

2.3 TCP VMT Compatibility Assessment

This portion of the analysis determined the compatibility of the project on a regional scale. It was accomplished using a projection of

effects of the proposed project on regional VMT, and assessing the effect relative to the regional VMT-reducing measures proposed as part of the TCP. This assessment is presented in Section 6.

3. BACKGROUND AIR QUALITY

Background CO levels are defined as those levels representative of the project area which are not directly influenced by a particular source(s). Since motor vehicle traffic is the only significant source of CO emissions in the project area, this definition implies that these levels are those not unduly influenced by traffic utilizing a roadway or particular set of roadways. Background defined in this manner is added to predicted (modeled) roadway-generated CO levels to yield predictions of total ambient CO concentrations downwind and within the area of roadway influence. Since CO air quality standards are expressed in terms of 1- and 8-hour levels not to be exceeded more than once per year, this analysis will consider background in terms of the second highest 1- and 8-hour levels. With peak 1- and 8-hour traffic volumes occurring between 6 AM and 9 PM, this background is defined in terms of this time period so that the 2nd highest total ambient CO concentrations in roadway environs can be predicted.

3.1 Existing (1974) Background CO Levels

Base year (1974) CO background in the project area was determined from a three month, two station measurement program implemented in the South Station area. Continuous CO, wind speed, and wind direction measurements were taken at the Roselot Site in the northern portion of the project area, and at the Tracks Site in the southern portion (see Figure 3-1). The measurements were taken continuously and reported as hourly averages. The program began on October 1, and extended through December 31, 1974. Two monitoring locations were selected since initial review of the area indicated the potential for two distinct CO background regimes. The northern portion of the project area is dominated by tall buildings, street canyons, and commercially-oriented traffic patterns on narrow streets. In contrast the southern area has significantly less building influence, and is well exposed to the high traffic volumes occurring on the Southeast Expressway, the Massachusetts Turnpike, and their associated interchanges. A complete discussion and tabulation of all measurements taken at each monitoring site is given in Appendix C.

In Table 3-1, the highest and second highest 1- and running 8-hour averages for each site are summarized. Figure 3-2 presents the diurnal

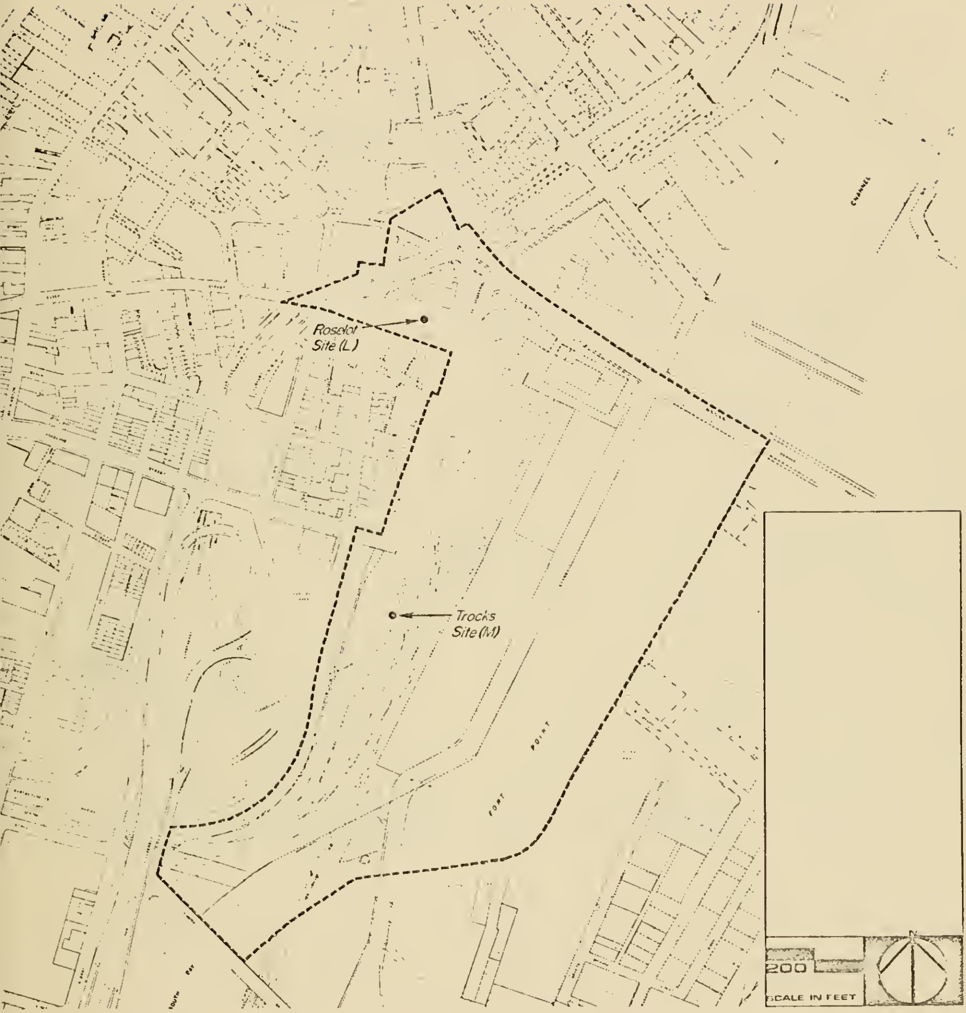

Figure 3-1 Location of Air Quality/Meteorological Monitoring Sites

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TABLE 3-1

SUMMARY OF CO LEVELS
MEASURED IN THE SOUTH STATION AREA
All concentrations are in ppm

	Roselot Site			Tracks Site		
	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
	One-Hour			One-Hour		
Highest	6.3	11.9	11.3	7.1	14.3	8.9
2nd Highest	6.1	10.1	8.8	7.0	11.8	7.0
Highest 6AM-9PM	6.3	9.2	8.5	7.1	8.7	8.9
2nd Highest 6AM-9PM	6.1	8.9	7.7	7.0	8.4	7.0
	Eight-Hour*			Eight-Hour*		
Highest	5.1	7.4	7.5	6.5	9.1	6.1
2nd Highest	5.0	7.4	7.3	6.2	9.0	6.1
Highest 6AM-9PM	5.1	6.3	6.7	6.5	8.3	6.1
2nd Highest 6AM-9PM	5.0	5.5	6.3	6.2	7.3	5.9

*The highest and second highest 8-hour CO concentrations presented in this table are running 8-hour averages which overlap.

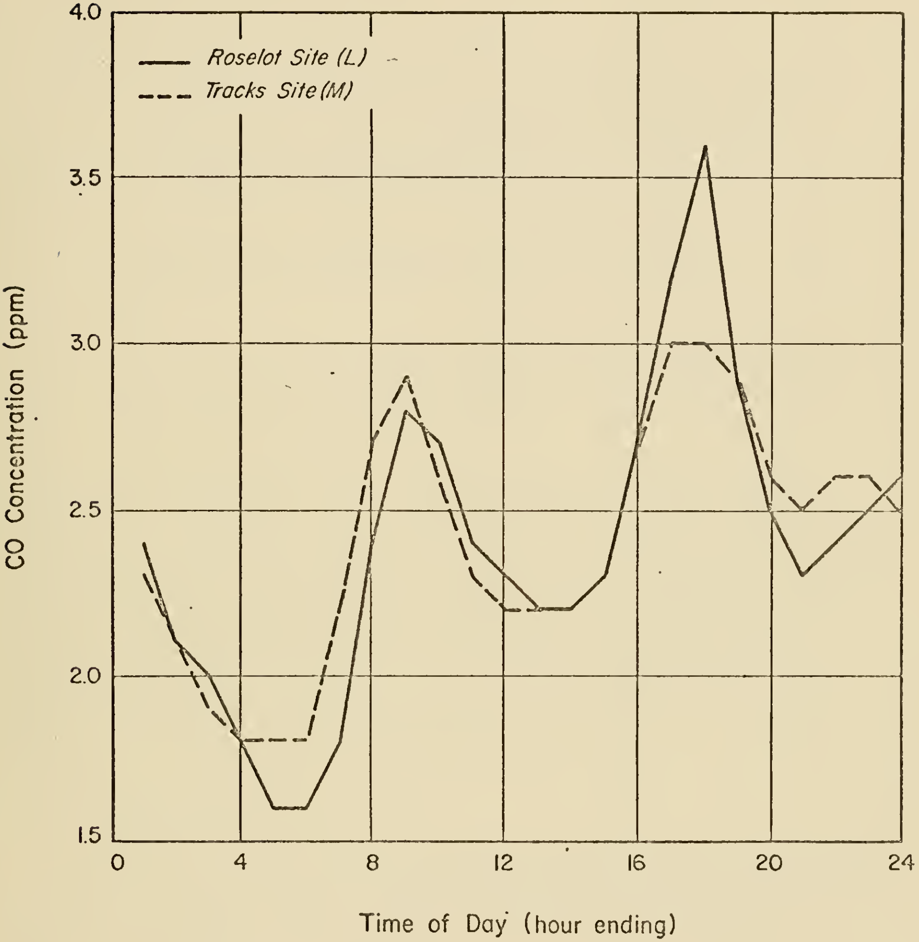

Figure 3-2 Carbon Monoxide Concentration Versus Time of Day

variation of average hourly CO levels. As indicated in Table 3-1 and Figure 3-2, the values measured at each location are quite similar, with the highest levels generally occurring at the Tracks Site. This indicates that the CO background in the project area was not as spatially variable as discussed above. Due to the similarity of measurements between sites, background CO air quality for analysis purposes was more explicitly defined for the 1- and 8-hour averaging periods as follows:

1. 1-hour: the second highest 1-hour level measured at either site.

2. 8-hour: the second highest running 8-hour average measured at either site which does not overlap the highest running 8-hour average measured at either site.

Using the above definitions, the CO concentrations in Table 3-1 were restated as background CO concentrations and are presented in Table 3-2. With respect to the 8-hour averaging period, it is clear that the highest and 2nd highest running 8-hour averages both occur at the Tracks Site in November. But, since these running 8-hour averages overlap, the 2nd highest non-overlapping 8-hour average, as defined above, became the highest running 8-hour average measured at the Roselot Site in December (see Tables C-7 through C-13 of Appendix C).

3.2 Projected Background CO Levels

Background CO levels were projected for future analysis years using the proportional model (PM)*. The PM assumes that air quality is directly proportional to emissions within some region or subregion. In algebraic form this can be expressed:

$$\mathrm{CO\ (F)} = \frac{\mathrm{EM(F)}}{\mathrm{EM(B)}}\ \mathrm{CO(B)} \qquad (3\text{-}1)$$

---

*Note that the proportional model when used to determine required emission reductions to attain a specific pollutant level, is commonly referred to as the Linear Rollback Model (LRM).

TABLE 3-2

1974 BACKGROUND CO LEVELS FOR THE SOUTH STATION AREA[1]

	Concentrations are in ppm (mg/m^3)	
	One-Hour[2]	Eight-Hour[3]
All Hours	11.9 (13.2)	7.5 (9.2)
6AM-9PM	8.9 (9.9)	6.7 (7.4)

[1] Based on CO measurements taken at both the Roselot and Tracks Sites.

[2] 1-hour background is the second highest level recorded at either site.

[3] 8-hour background is the second highest 8-hour average recorded at either location which does not overlap the highest 8-hour average measured at either location.

where

CO(F) = CO air quality background in the future year,
CO(B) = CO air quality background in the base year (1974),
EM(F) = CO emissions in the future year, and
EM(B) = CO emissions in the base year.

With motor vehicle traffic the only significant source of CO emissions within the project area, this expression can be rewritten as

$$CO(F) = \frac{VMT(F)}{VMT(B)} \frac{EV(F)}{EV(B)} CO(B) \tag{3-2}$$

where

VMT(F) = vehicle miles travelled in the future year,
VMT(B) = vehicle miles travelled in the base year,
EV(F) = average emissions per vehicle-mile in the future year,
EV(B) = average emissions per vehicle-mile in the base year,

and CO(F) and CO(B) are as defined in equation (3-1).

With newer "clean" vehicles replacing older "dirty" vehicles (the FMVCP), and with the emission-reducing effects of the MBIAQCR TCP, the average emissions per vehicle-mile within the region will decrease significantly in future years. Assuming no growth* in VMT(6) in the Boston core, significant reductions in the CO background will be experienced. However, for analysis purposes no further improvement in background CO air quality will be assumed after May 31, 1977, the required attainment date for the CO standards in the MBIAQCR. This assumption implies that maintenance of the CO standard will allow for an increase in VMT equal to the decrease in the average CO emissions per vehicle after May 31, 1977. Expressed in algebraic form:

$$VMT(POST\text{-}77)\ EV(POST\text{-}77) = VMT(77)\ EV(77) \tag{3-3}$$

---

*Explicitly the no growth VMT assumption in this study means that VMT(74) = VMT(77). This is based on the implications within the proposed TCP that are expected to reduce VMT(77) by 12%. With current growth rates between 1% and 3%, the 12% VMT reduction will insure that VMT(77) = VMT(74).

Using equation (3-2), the present form of the FMVCP and MBIAQCR TCP, and the limited VMT growth condition of equation (3-3), future background CO levels can be expressed by equation (3-4):

$$CO(F) = CO(74)\ (0.46)^{*} \qquad (3\text{-}4)$$

where

$CO(F)$ = 1977 and post-1977 background CO levels, and
$CO(74)$ = 1974 background CO levels.

Multiplying the background CO levels in Table 3-2 by 0.46 results in the 1977 and post-1977 CO background as summarized in Table 3-3.

TABLE 3-3

PROJECTED 1977 and POST-1977 BACKGROUND CO LEVELS
FOR THE SOUTH STATION AREA

	Concentrations are in ppm (mg/m^3)	
	One-Hour	Eight-Hour
All Hours	5.5 (6.1)	3.5 (3.8)
6AM-9PM	4.1 (4.5)	3.1 (3.4)

---

*Since VMT(74) = VMT(77), 0.46 is the ratio of EV(74) and EV(77). EV(74) and EV(77) are computed as indicated in Appendix B.

4. CO DISPERSION MODELING ANALYSIS

As a practical matter, it is not feasible to assess the potential CO air quality impact of each alternative for all possible combinations of meteorological and traffic conditions that could occur within the project area. Therefore, the modeling analysis employed in this assessment assumed "worst case" conditions of high pollutant emissions and adverse meteorology at several representative locations within the project area. These worst case[1] assumptions result in CO concentrations which represent an upper bound on expected facility-related levels. Since the peak 1- and 8-hour traffic periods occur during daylight hours, these worst case predicted roadway levels, when added to the second highest 6AM-9PM background CO levels, result in a realistic prediction of the second highest total ambient CO levels in the roadway environs. This worst case rationale is appropriate since the NAAQS for CO addressed by this study are not to be exceeded more than once per year. Both the 1 and 8-hour averaging period are evaluated by means of worst case model simulations.

The primary diffusion models used were the ERT numerical models EGAMA and the EGAMA submodel CANYON. Both EGAMA and CANYON have specific features which allow the simulation of atmospheric dispersion in the vicinity of buildings and other wind obstructions. CANYON is a specific modification of EGAMA applied in the evaluation of urban street canyons. In addition, an area source model based on the work of Gifford and Hanna was used to evaluate the special case of winds blowing directly along (parallel to) a roadway.

The worst case conditions assumed in the EGAMA and CANYON modeling were:

a) Worst 1-hour analyses

Traffic: Peak hour traffic volume, speed, and vehicle mix[2]

---

[1] Worst case, throughout this report, implies that the estimates or assumptions made overstate expected emissions or the resulting concentrations and potential impact.

[2] Assortment of cars, buses, and trucks

Meteorology: Stability - Neutral
Wind Speed - 2.0 m/sec at roof-top level
Wind Direction - as specified in each analysis

b) Worst 8-hour analyses

Traffic: Peak eight-hour traffic volume, speed, and vehicle mix

Meteorology: Stability - Neutral
Wind Speed - 2.5 m/sec at roof-top level
Wind Direction - as specified in each analysis

The parallel wind analyses employed identical worst-case assumptions except that the above wind speeds were assumed to be the average wind speed between street and roof-top level.

Neutral stability was assumed in all modeling analyses. Wind speed assumptions were based on an interpretation of meteorological measurements made in the South Station area (see Appendix C), an evalution of current literature, and ERT professional experience in urban dispersion modeling. Since model predictions are nearly inversely proportional to wind speed, results may be scaled to another wind speed using the equation:

$$\chi = \frac{U_o}{U} \chi_o$$

where

χ = CO concentration that would result assuming another wind speed, U

U = new wind speed to be assumed

χ_o = predicted CO concentration

U_o = wind speed that resulted in concentration χ_o

Complete documentation of the models and the meteorological assumptions employed is provided in Appendix D.

4.1 Selection of Modeling Locations

Based on consideration of both the one- and eight-hour averaging periods prescribed by the NAAQS and the reasonableness of a receptors exposure for each averaging period, preliminary modeling locations were selected, consistent with the study objectives:

(a) to identify existing air quality in the South Station area, and

(b) to predict representative future air quality conditions resulting from each of the no build and build alternatives.

In regard to (a), special attention was directed at identifying those areas currently exceeding standards. With respect to (b), location were chosen (1) to identify potential exacerbation of existing air quality levels already in excess of the NAAQS, (2) to point out those areas in which the NAAQS are not presently, but potentially may be contravened with either the no build or build alternatives and (3) to provide a comparison of roadway links whose no build and build emission source strengths exhibit a significant change in magnitude.

To aid in the selection, a preliminary evaluation of the project area was performed using the well-known APRAC-1a(7) expression for the leeward ground-level concentration in street canyons. With knowledge of the canyon widths and the source strengths calculated in Appendix B, approximate calculations were performed for the many street canyons that presently exist or will be created from proposed construction in the South Station area. The canyons were ranked in order of the relative CO levels expected in each case and the list was supplemented with a qualitative evaluation of other non-street canyon cross sections that indicated modeling potential.

Another important consideration in the selection process was the current state-of-the-art in modeling pollutant dispersion in urban areas. As outlined in Section 1.5 and more fully in Appendix D, the meteorology and wind flow patterns which characterize urban areas have only recently been investigated and are a topic of much current research. Only their most basic features have been studied in sufficient detail to allow the complete mathematical interpretation necessary to produce a

workable model for air quality prediction. Only those building configurations which are consistent with the capabilities of the model (see Section D.3) can be simulated.

In light of the objectives and limitations discussed above, five roadway cross sections were selected for diffusion modeling and presented to EPA for comment during a January 31, 1975 meeting (see Appendix E). These cross sections are indicated by the heavy black lines and large numerals in Figures 4-1 through 4-3 depicting the location of each cross section in the existing, no build, and build cases respectively. In addition, Summer Street (oriented southeast-northwest), and Kneeland Street (oriented west northwest-east southeast) were selected for the parallel wind analysis.

EPA commented that the area to the south of the project in the vicinity of the Southeast Expressway and Massachusetts Turnpike was of critical concern with respect to excessive CO levels and deserved special consideration in the selection of modeling locations if the proposed project impacted upon traffic in these environs. Based on traffic data supplied by Metcalf and Eddy, Inc.,* the proposed project was not found to increase traffic volumes on the Southeast Expressway or the Massachusetts Turnpike ramps connecting at Kneeland Street. Therefore, since no alteration of traffic characteristics are expected in this area, potential modeling locations south of Kneeland Street were not considered.

4.2 EGAMA/CANYON CO Modeling Analyses

In this section, modeling results are presented for the existing (1974) case, and for Alternatives 1, 2, and 3, in both 1981 and 1991 as described in Section 1.4. Graphic representation of model calculations are presented for 1974 and 1981 with appropriate discussion in the text. The 1991 results are not graphically displayed but are discussed in the text.

4.2.1 Cross Section #1 - Kneeland Street Between Tyler and Hudson Streets

Traffic volumes and speeds, and the resulting CO emission source strengths used as input to these analyses are presented in Table 4-1. Worst case meteorology is as defined above.

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*Traffic data upon which air quality calculations are based is incorporated in Appendix B.

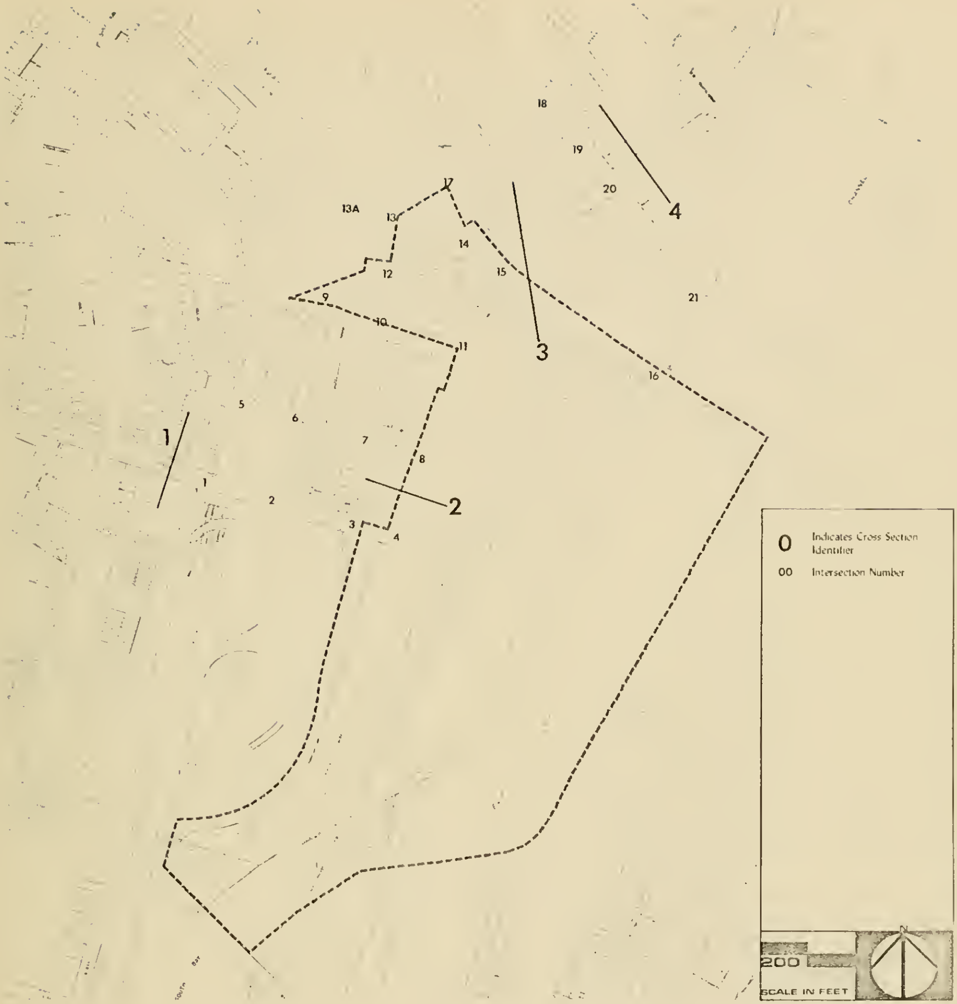

Figure 4-1 Locations of Cross Sections Studied in CO Modeling for the Existing (1974) Case, Plan A

FIGURE

BOSTON
REDEVELOPMENT
AUTHORITY

SOUTH
STATION

ENVIRONMENTAL
IMPACT
REPORT

ENVIRONMENTAL RESEARCH
& TECHNOLOGY INC

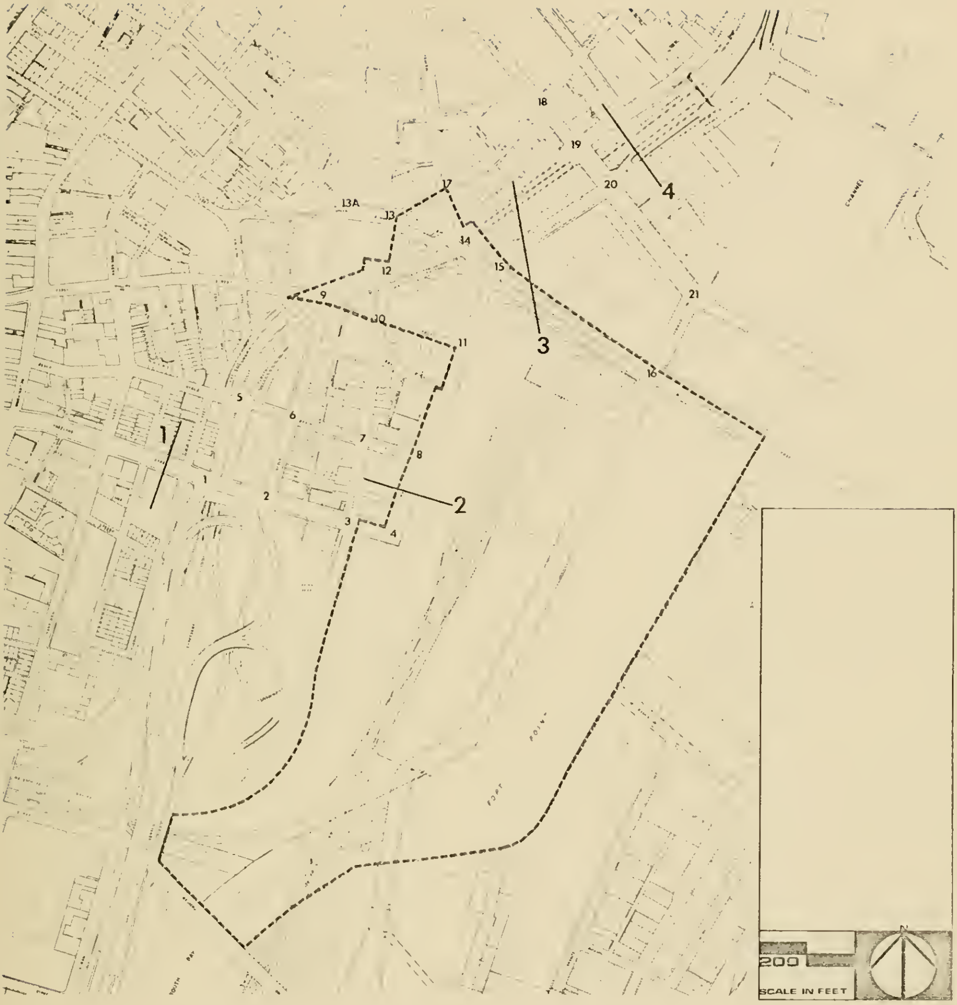

Figure 4-2 Locations of Cross Sections Studied in CO Modeling for the No-Build Cases (1981 and 1991), Plan B

FIGURE

BOSTON
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AUTHORITY

SOUTH STATION ENVIRONMENTAL IMPACT REPORT

ENVIRONMENTAL RESEARCH
& TECHNOLOGY INC

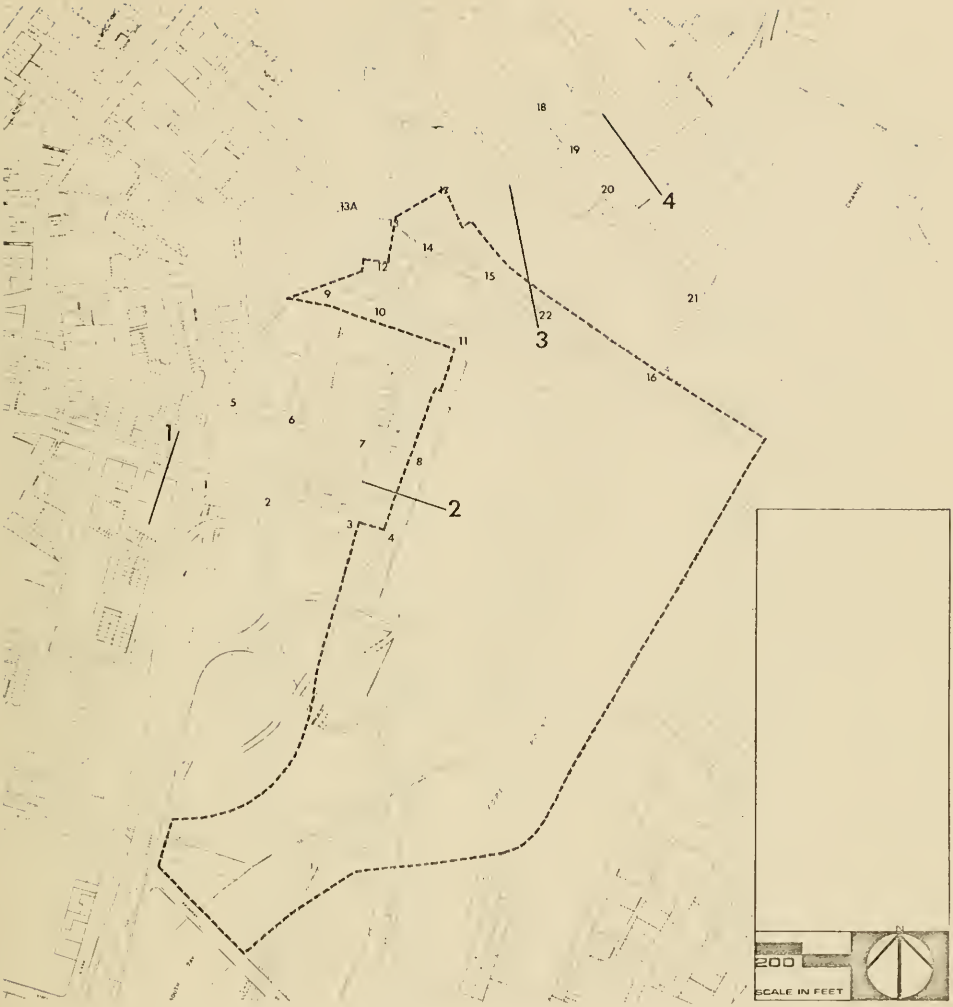


Figure 4-3 Locations of Cross Sections Studied in CO Modeling for the Build Cases (1981 and 1991), Plan C

FIGURE

**BOSTON
REDEVELOPMENT
AUTHORITY**

**SOUTH
STATION**

**ENVIRONMENTAL
IMPACT
REPORT**

ENVIRONMENTAL RESEARCH
& TECHNOLOGY INC.

TABLE 4-1

CROSS SECTION #1 - TRAFFIC DATA AND RESULTING CO EMISSION SOURCE STRENGTHS USED IN MODELING

	1974				1981				1991					
	Existing	Plan A	No Build	Plan B	Build-2500 Plan C-2500		Build-1000 Plan C-1000		No Build	Plan B	Build-2500 Plan C-2500		Build-1000 Plan C-1000	
Link[1]	Volume/ Speed[2]	Source Strength[3]	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength
							1-Hour							
A-1	1060P[4]/7.5	28.099	860P/7.5	5.545	1210P/5	11.546	1230P/5	11.689	860P/7.5	2.168	1210P/5	4.478	1230P/5	4.592
1-A	710P/5.0	28.137	760P/5	7.267	1010P/5	9.651	1020P/5	10.107	760P/5	2.800	1010P/5	3.727	1020P/5	4.116
							8-Hour							
A-1	6300/10.0	16.316	6880/10	4.830	8040/7.5	7.433	7490/7.5	7.148	6880/10	2.289	8040/7.5	3.499	7480/7.5	3.481
1-A	5140/7.5	17.704	5500/7.5	5.087	6700/7.5	6.196	6200/7.5	5.734	5500/7.5	2.384	6700/7.5	2.904	6200/7.5	2.690

[1] See Figures B-4 through B-6 of Appendix B

[2] Volumes are in vehicles/specified time period
All speeds are in mi/hr

[3] Units of mg/m-sec

[4] Denotes whether peak 1-hour occurs in AM or PM

1-Hour Analysis

The results of the dispersion modeling analysis of worst 1-hour existing (Plan A) case CO concentrations expected at Cross Section #1 - a street canyon along Kneeland Street between Tyler and Hudson Streets - are presented in Figure 4-4. This figure represents a vertical cross section of Kneeland Street, showing the variation of CO concentration as a function of height and downwind distance in the canyon. The relative location of buildings and roadways are noted and isopleths (contours) representing equal CO concentrations in the street canyon during the evening rush hour are shown for representative concentration levels. A 2 m/sec northerly roof-top wind is simulated, blowing from left to right above the cross section. As a result of the induced channel vortex flow, concentrations vary significantly throughout the cross section, with a maximum roadway-generated value of 45.6 mg/m^3 occurring on the sidewalk along the northern side of Kneeland Street. Windward (see Figure B-7 of Appendix B) concentrations are significantlv lower than corresponding leeward levels, as is expected with the street canyon flow. On the sidewalk along the south side of Kneeland Street, a roadway-related CO concentration of 14.2 mg/m^3 is expected in the existing case. The distribution of CO concentrations throughout the remainder of the cross section is characterized by traffic-related concentration ranging from about 40 mg/m^3 along the leeward building surface to 10 mg/m^3 along the windward.

Addition of a 1-hour background CO concentration of 9.9 mg/m^3, as determined in Section 3, to the model predictions results in a maximum total air quality level of 55.5 mg/m^3 along the leeward sidewalk. All other total levels are below the 40 mg/m^3 one-hour NAAQS at distances greater than approximately 5 meters from the leeward canyon wall.

Worst 1-hour roadway-related concentrations expected with the no build alternative in 1981 (Plan B) are shown in Figure 4-5. As indicated, Kneeland Street has been widened to 3 lanes in each direction. The effects of the FMVCP and the TCP are clearly evident, reducing the maximum traffic-generated concentration expected in 1981 to 11.3 mg/m^3, and to 4.4 mg/m^3 in 1991. Concentrations expected in 1981 range from this 11.3 mg/m^3 maximum along the northern sidewalk of Kneeland Street to approximately 3.0 mg/m^3 along the southern sidewalk. Ambient levels

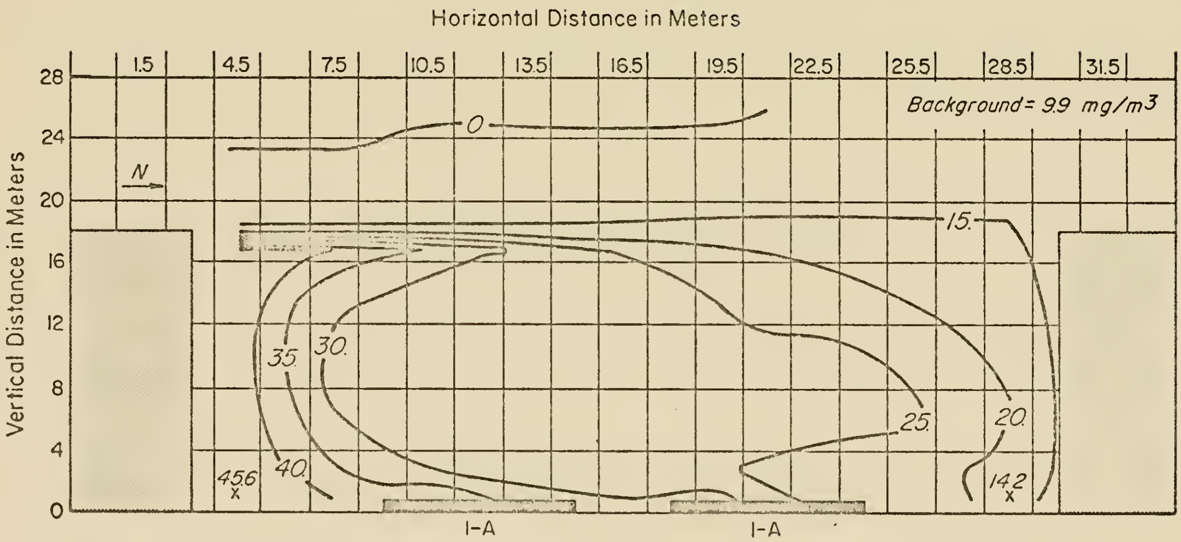


Figure 4-4 Worst Hourly CO Concentration (mg/m^3) at Cross Section 1 for the Existing (1974) Case, Plan A

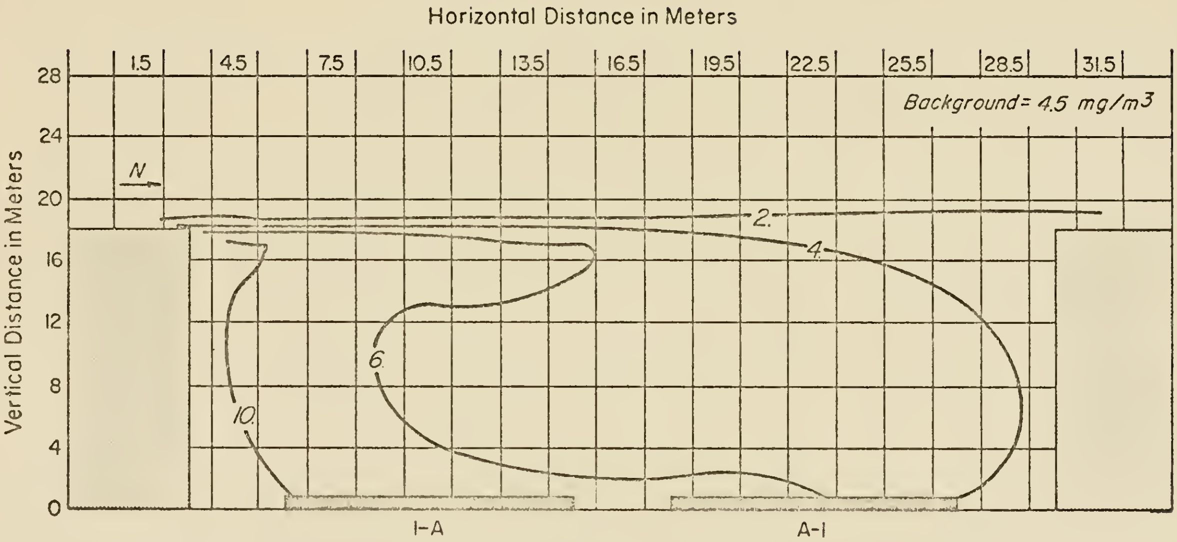


Figure 4-5 Worst Hourly CO Concentration (mg/m^3) at Cross Section 1 for the No-Build (1981) Case, Plan B

throughout the remainder of the cross section are about 6.0 mg/m^3. In 1991, predicted concentrations range from a maximum traffic-related level of 4.4 mg/m^3 on the leeward sidewalk to 1.2 mg/m^3 on the windward walkway, with typical concentrations throughout the cross section of about 2.5 mg/m^3. With the addition of a 4.5 mg/m^3 future 1-hour background as determined in Section 3, the maximum total CO level expected to result from the no build alternative is 15.8 mg/m^3 with other concentrations in the cross section less than 15 mg/m^3 in 1981. A maximum 1991 total CO level of 9.9 mg/m^3 is expected to occur along the leeward sidewalk, with nearly equal contributions from roadway traffic (4.4 mg/m^3) and background (4.5 mg/m^3) by this date. All no build CO levels are well within the 40 mg/m^3 1-hour NAAQS, with the maximum total 1981 level less than 40% of the standard.

The 1981 worst 1-hour CO levels expected with the proposed transportation center and 2500-car capacity garage (Plan C-2500) are depicted in Figure 4-6 for a southerly roof-top wind speed of 2 m/sec. Like the no build case, levels show a significant improvement over the existing case. A maximum roadway-generated concentration of 18.5 mg/m^3 is expected on the leeward sidewalk in 1981, with concentrations typically less than 10 mg/m^3 throughout the remainder of the cross section. A maximum total CO level of 23 mg/m^3 will result in 1981 with the addition of a 4.5 mg/m^3 background. A 1991 maximum traffic-generated concentration of 7.2 mg/m^3 produces a maximum total CO level of 11.7 mg/m^3. These total 1981 and 1991 levels are only 58% and 30% of the applicable 40 mg/m^3 NAAQS, respectively.

The results of the analysis of worst 1-hour CO concentrations expected to result from the proposed construction with a 1000-car capacity garage (Plan C-1000) are shown in Figure 4-7. The maximum roadway-generated concentration of 19.0 mg/m^3 is expected to occur in 1981 at the base of buildings on the leeward side of Kneeland St. with a southerly rooftop wind of 2 m/sec. This level is reduced to 7.6 mg/m^3 in 1991. With the contribution of 4.5 mg/m^3 from the future 1-hour background, these maximum traffic-generated levels result in maximum total air quality levels of 23.5 mg/m^3 in 1981 and 12.1 mg/m^3 in 1991. As with Plan C-2500, these levels are well below the 40 mg/m^3 standard.

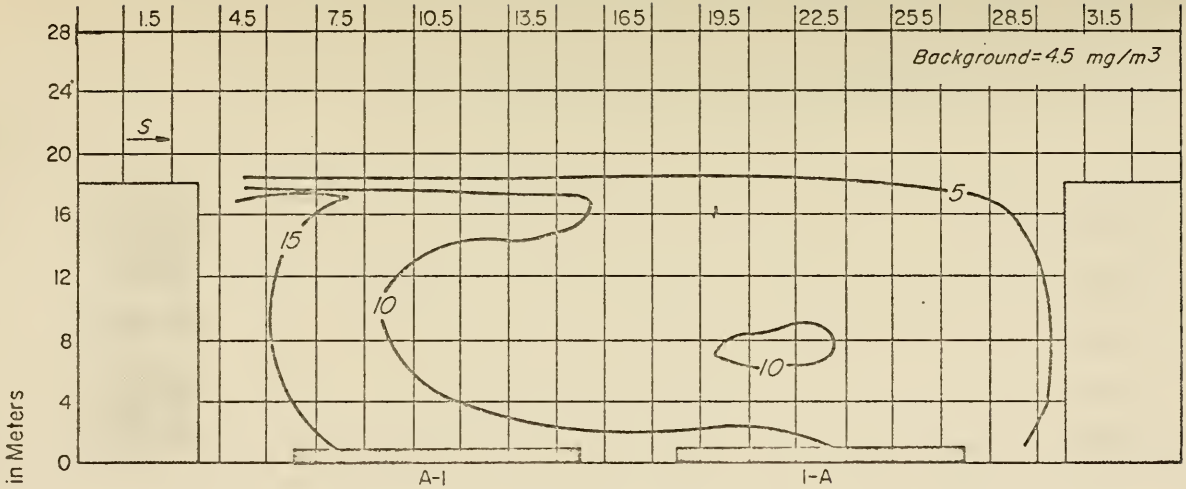


Figure 4-6 Worst Hourly CO Concentration (mg/m^3) at Cross Section 1 for the Build-2500 (1981) Case, Plan C-2500

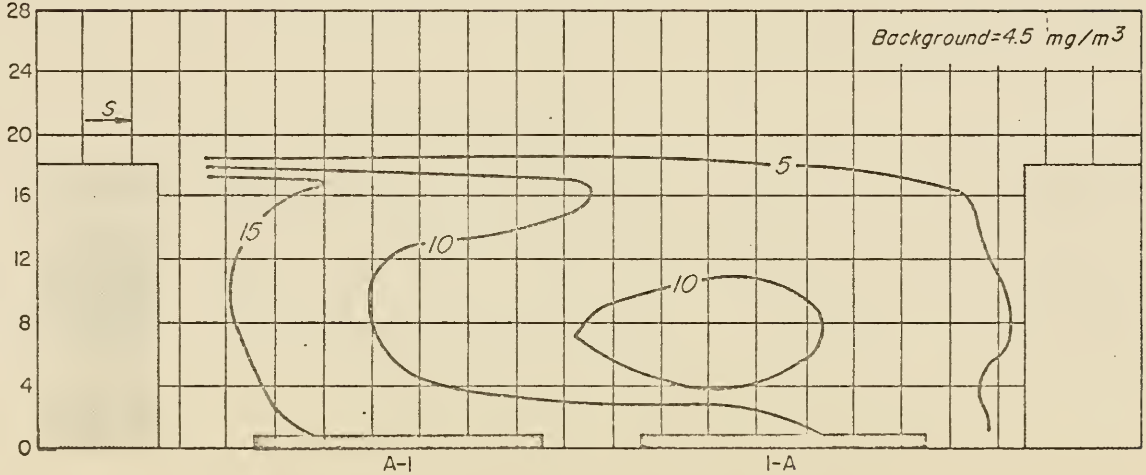


Figure 4-7 Worst Hourly CO Concentration (mg/m^3) at Cross Section 1 for the Build-1000 (1981) Case, Plan C-1000

8-Hour Analysis

Analyses of worst 8-hour roadway-generated CO concentrations are shown in Figures 4-8 through 4-11. Figure 4-8 illustrates model-predicted existing case (Plan A) peak 1-hour concentrations for Cross section #1 at Kneeland St. For a persistent eight-hour northerly roof-top wind of 2.5 m/sec blowing above the cross section, a maximum 8-hour roadway generated concentration of 22.1 mg/m^3 is expected to occur on the leeward sidewalk along Kneeland St. Concentrations near the windward walkway are expected to be approximately 10 mg/m^3. Typical values throughout the remainder of the cross section are approximately 12.5 mg/m^3. With the addition of the existing 8-hour background of 7.4 mg/m^3 determined in Section 3, a maximum total 8-hour air quality level of 29.5 mg/m^3 is predicted to occur at the leeward building surface. This 29.5 mg/m^3 is nearly three times the 10 mg/m^3 NAAQS for the 8-hour averaging period.

Worst 8-hour CO concentrations expected with the no build alternative in 1981 and a north wind are presented in Figure 4-9. In 1981, a maximum roadway-related concentration of 6.9 mg/m^3 is expected along the northern edge of the cross section, with windward values of approximately 3 mg/m^3 expected. The contribution of a 3.4 mg/m^3 future 8-hour background results in a maximum expected total air quality level of 10.3 mg/m^3, slightly in excess of the 10 mg/m^3 standard. All concentrations are within the 10 mg/m^3 standard for downwind distances greater than 2 meters from the sidewalk and vertical distances greater than about 5 meters above the roadway. In 1991 the maximum traffic-related concentration of 3.2 mg/m^3 on the leeward sidewalk results in a total 8-hour air quality level of 6.6 mg/m^3, less than two thirds of the standard. Again, by 1991 roadway traffic (3.2 mg/m^3) and background (3.4 mg/m^3) contribute nearly equally to expected air quality levels.

Figure 4-10 presents the expected 1981 roadway-generated 8-hour concentrations for Plan C-2500. In 1981 the maximum traffic-generated leeward level of 9.5 mg/m^3 occurs with a southerly wind. On the windward sidewalk a concentration of about 3 mg/m^3 is expected. With a 3.4 mg/m^3 contribution representing projected future background, a maximum total air quality level of 12.9 mg/m^3 is expected, less than 30% above the 8-hour standard. By 1991 all levels throughout the cross section

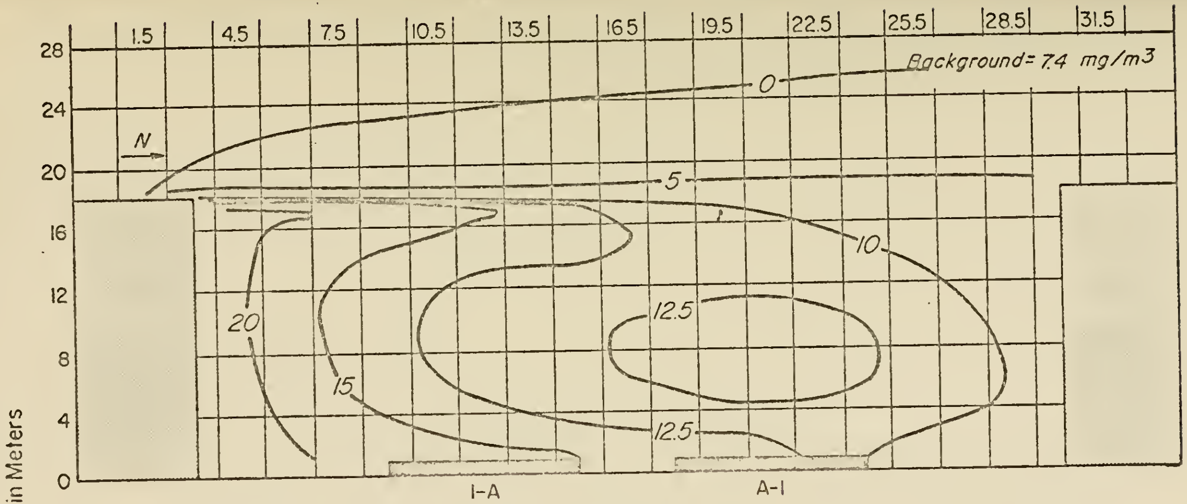


Figure 4-8 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 1 for the Existing (1974) Case, Plan A

4-8

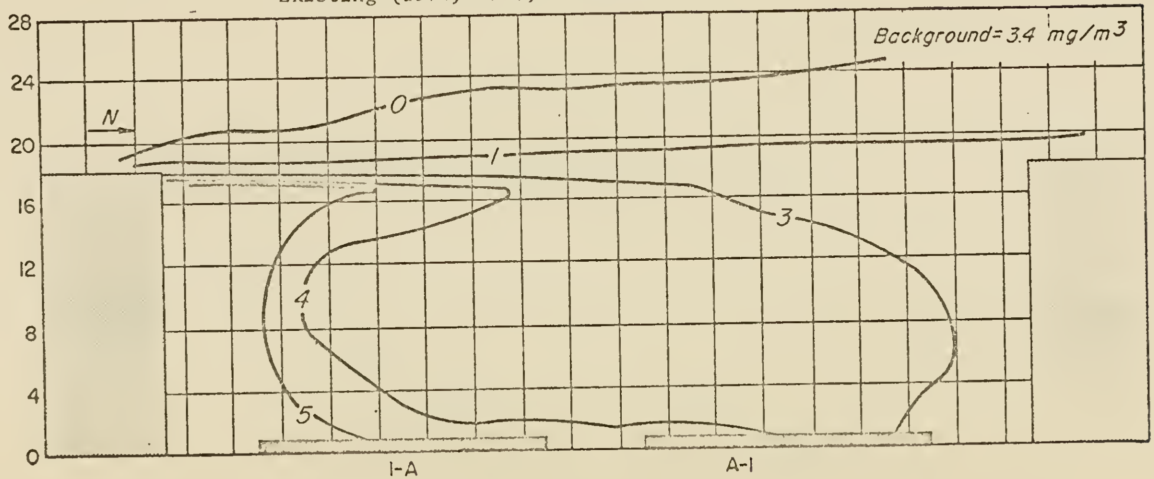
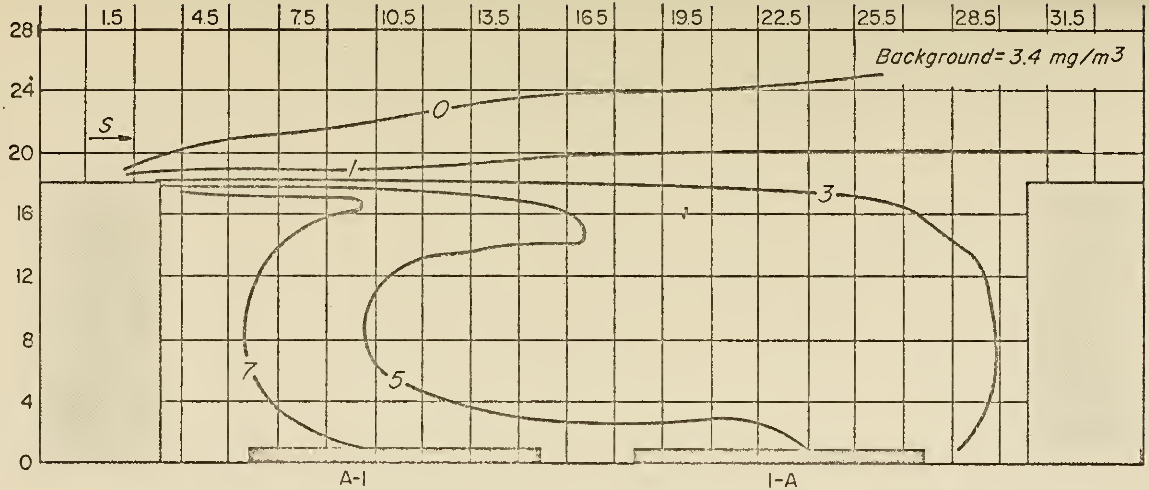


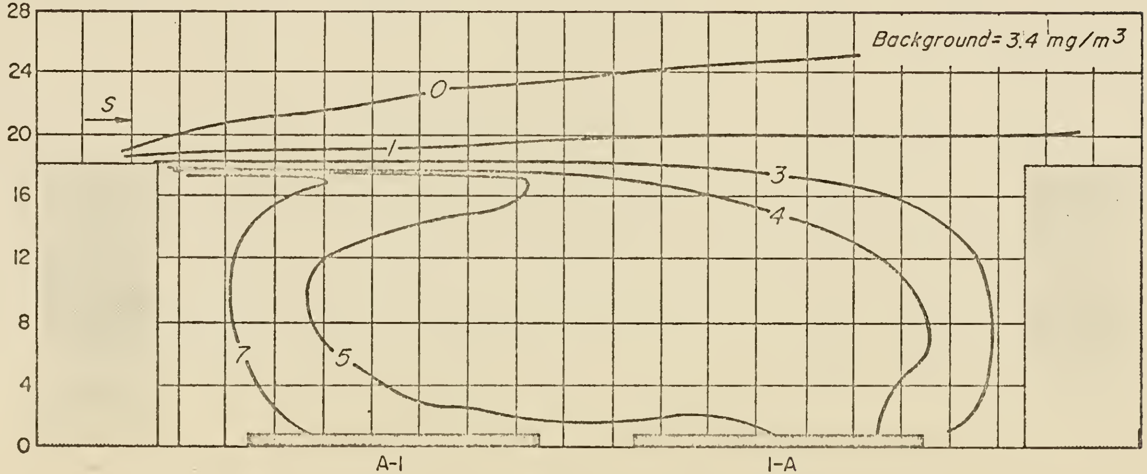
Figure 4-9 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 1 for the No Build (1981) Case, Plan B

4-9



4-10

Figure 4-10 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 1 for the Build-2500 (1981) Case, Plan C-2500



4-11

Figure 4-11 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 1 for the Build-1000 (1981) Case, Plan C-1000

will be below the 10 mg/m^3 standard, with a maximum total air quality level of 7.8 mg/m^3 occurring on the leeward walkway.

1981 traffic-related concentrations expected to result from Plan C-1000 are shown in Figure 4-11. Roadway-generated levels are all below the 10 mg/m^3 standard. However, the contribution of the 8-hour future background of 3.4 mg/m^3 results in a 1981 maximum total level of 12.4 mg/m^3, less than 25% above the NAAQS. By 1991, this maximum total is less than 8 mg/m^3, well below the standard.

4.2.2 Cross Section #2 - Atlantic Ave. between Kneeland and Beach Streets

Table 4-2 presents the traffic data and emission source strengths employed in these analyses.

1-Hour Analysis

Figures 4-12 through 4-15 present the results of the dispersion modeling analysis of worst 1-hour CO levels for a cross section of Atlantic Ave. between Kneeland and Beach Streets and adjacent to the site of the proposed facility. In the existing and no build cases the modeling assumed an easterly rooftop wind blowing across the railroad yard toward the existing buildings along the westerly side of Atlantic Ave. This wind direction, when compared to a westerly flow, was found to give the worst case. Build cases assumed the construction of the facility along the easterly side of Atlantic Ave., forming a street canyon, and yield peak concentrations for either an easterly or westerly wind.

In Figure 4-12, the results of the worst 1-hour existing (Plan A) case analysis of this cross section are presented. As indicated, Atlantic Ave. is presently two-way with two lanes in each direction. Existing traffic is expected to produce a maximum concentration of 7.4 mg/m^3 near the downwind of the southbound roadway. With the addition of a 9.9 mg/m^3 existing case background, all concentrations throughout the cross section are less than 17.3 mg/m^3, only 43% of the 1-hour standard. Since the no build cross section geometry remains unchanged from the existing case, 1981 (see Figure 4-13) and 1991 no build levels are significantly lower. The 1981 and 1991 1-hour maximum total air quality

	1974				1981				1991					
	Existing	Plan A	No Build	Plan B	Build-2500 Plan C-2500		Build-1000 Plan C-1000		No Build	Plan B	Build-2500 Plan C-2500		Build-1000 Plan C-1000	
Link [1]	Volume/ Speed [2]	Source Strength [3]	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength
							1-Hour							
8-4	[4] 520P/17.5	6.021	750P/15	2.472	-	-	-	-	750P/15	.978	-	-	-	-
4-8	780A/20.0	7.929	900A/20	2.283	1750P/17.5	5.224	1700P/17.5	5.075	900A/20	.939	1750P/17.5	2.247	1700P/17.5	2.183
							8-Hour							
8-4	1820/20.0	2.385	3440/17.5	1.410	-	-	-	-	3956/17.5	.792	-	-	-	-
4-8	3910/22.5	4.555	4320/22.5	1.380	10960/20	4.148	10860/20	4.111	4968/22.5	.767	10960/20	2.107	10860/20	2.088

[1] See Figures B-4 through 8-6 of Appendix B

[2] Volumes are in vehicles/specified time period.
All speeds are in mi/hr.

[3] Units of mg/m-sec.

[4] Denotes whether peak 1-hour occurs in AM or PM.

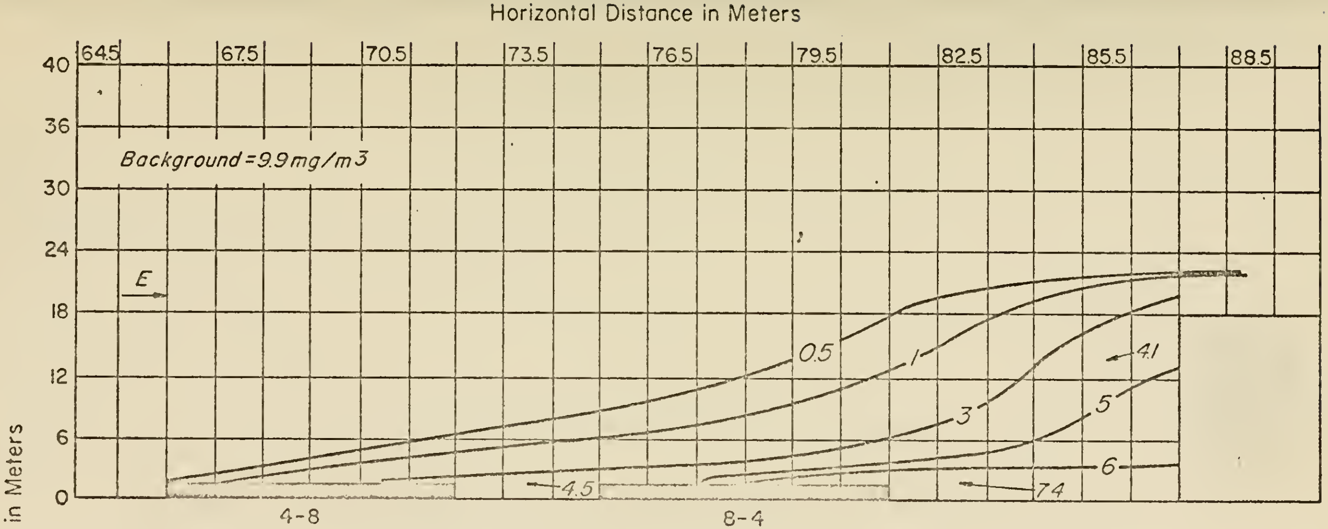


Figure 4-12 Worst Hourly CO Concentration (mg/m^3) at Cross Section 2 for the Existing (1974) Case, Plan A

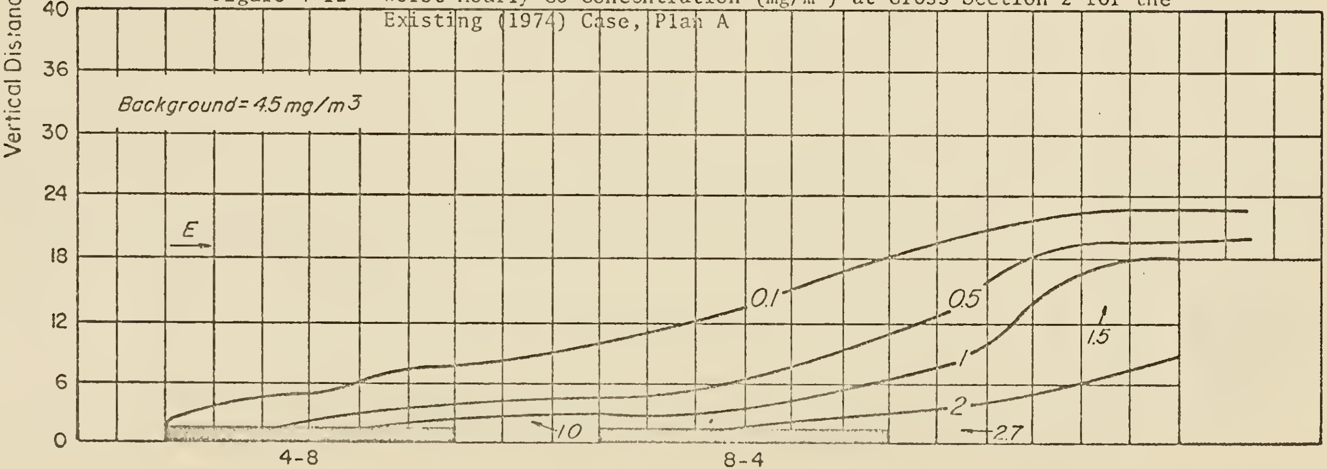


Figure 4-13 Worst Hourly CO Concentration (mg/m^3) at Cross Section 2 for the No-Build (1981) Case, Plan B

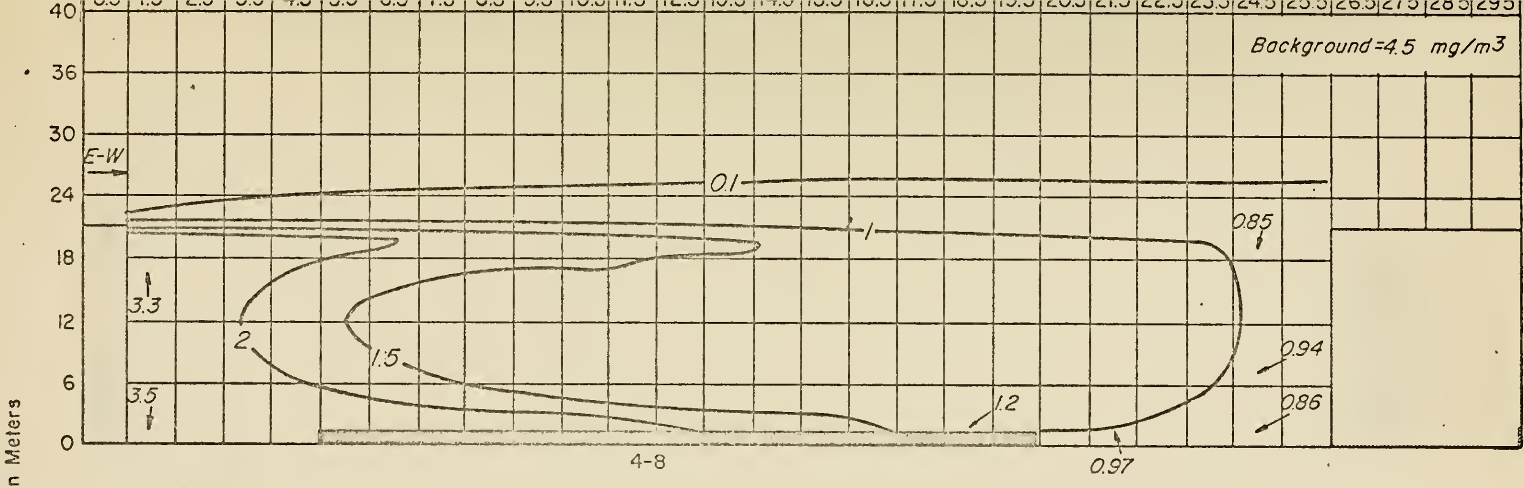


Figure 4-14 Worst Hourly CO Concentration (mg/m^3) at Cross Section 2 for the Build-2500 (1981) Case, Plan C-2500

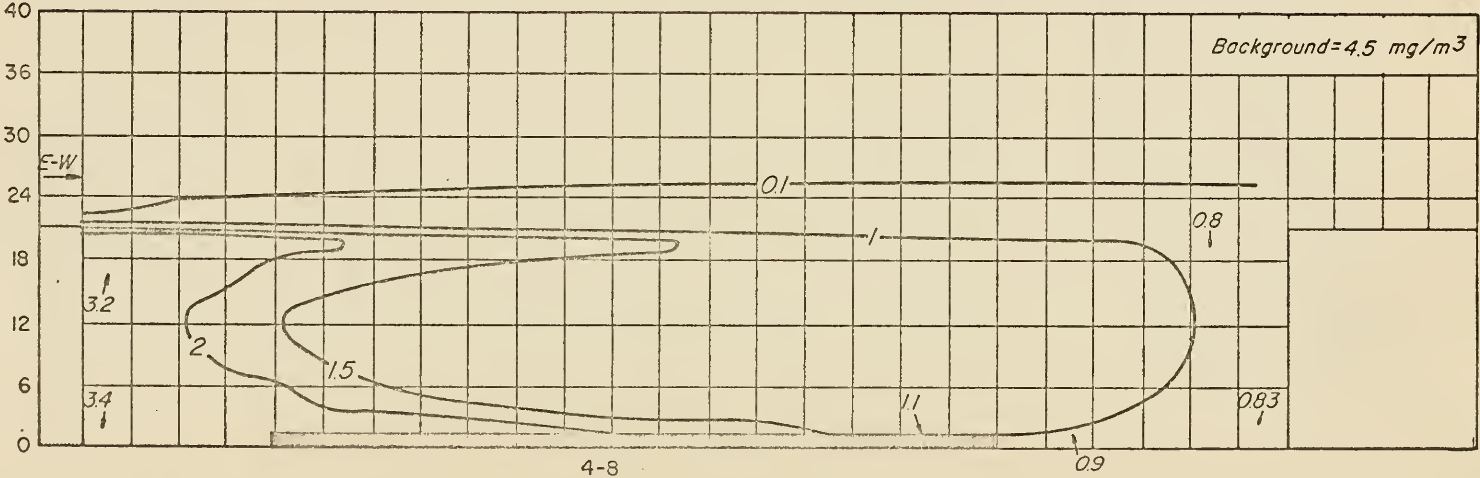


Figure 4-15 Worst Hourly CO Concentration (mg/m^3) at Cross Section 2 for the Build-1000 (1981) Case, Plan C-1000

levels of 7.2 mg/m^3 and 5.6 mg/m^3 are only 18% and 14% of the standard, respectively. Despite the change to a street canyon geometry and one-way traffic in the build cases (Plans C-2500 and C-1000), a 1981 maximum total air quality level of 7.9 mg/m^3 is expected with Plan C-2500 and a level of 7.8 is anticipated with Plan C-1000 (see Figures 4-14 and 4-15). Expected 1991 maximum total levels are 6.0 mg/m^3 for both alternatives. All concentrations expected in the build cases represent air quality levels which are less than 20% of the 40 mg/m^3 NAAQS.

8-Hour Analysis

Eight-hour roadway-generated CO levels throughout Cross Section #2 are depicted in Figures 4-16 through 4-19. Existing maximum roadway-related 8-hour levels of less than 3.0 mg/m^3 are predicted throughout the cross section. However, the significant contribution (7.4 mg/m^3) of the existing 8-hour background produces an 8-hour maximum total air quality level of 10.3 mg/m^3, slightly in excess of the 10 mg/m^3 8-hour standard (see Figure 4-16). Lower traffic-generated levels, favorable dispersion geometry, and a future 8-hour background of 3.4 mg/m^3 combined to yield 1981 and 1991 no build maximum total air quality levels of 4.7 mg/m^3 and 4.1 mg/m^3, respectively (see Figure 4-17). Air quality levels associated with the 1981 build alternatives as shown in Figures 4-18 and 4-19 result in maximum total CO concentrations of 6.6 mg/m^3 with Plans C-2500 and C-1000, less than 2/3 of the applicable NAAQS. 1991 levels are further reduced, with maximum total air quality levels of 4.5 mg/m^3 expected with either build alternative.

4.2.3 Cross Section #3 - Purchase St. to Summer St.

Traffic and emissions data used in these analyses are summarized in Table 4-3.

1-Hour Analysis

Figures 4-20 through 4-23 present the worst 1-hour CO concentrations for Cross Section #4. The traffic data and emission source strength upon which this analysis is based are presented in Table 4-3. With the north-northwesterly wind direction assumed for both the 1- and 8-hour analyses, the cross section begins at the northern side of

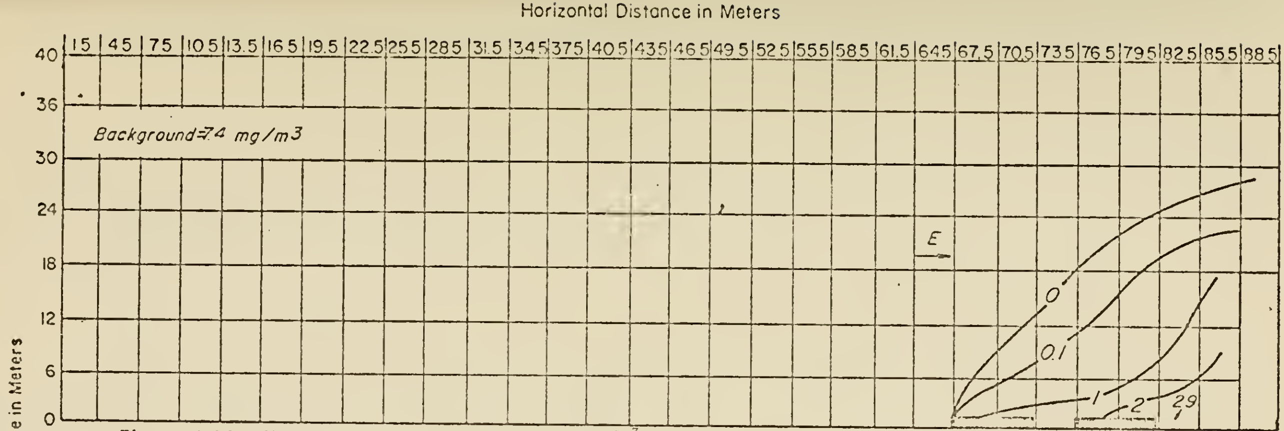


Figure 4-16 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 2 for the Existing (1974) Case, Plan A

16

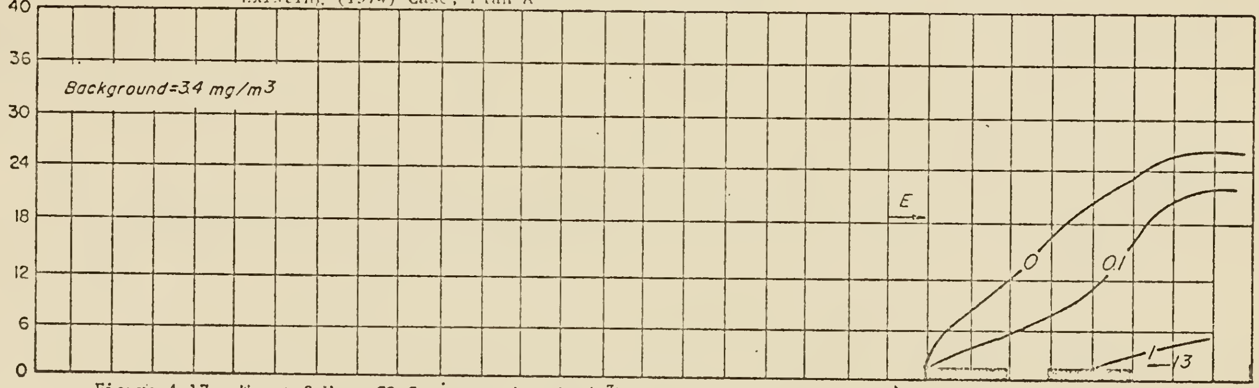


Figure 4-17 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 2 for the No-Build (1981) Case, Plan B

4-17

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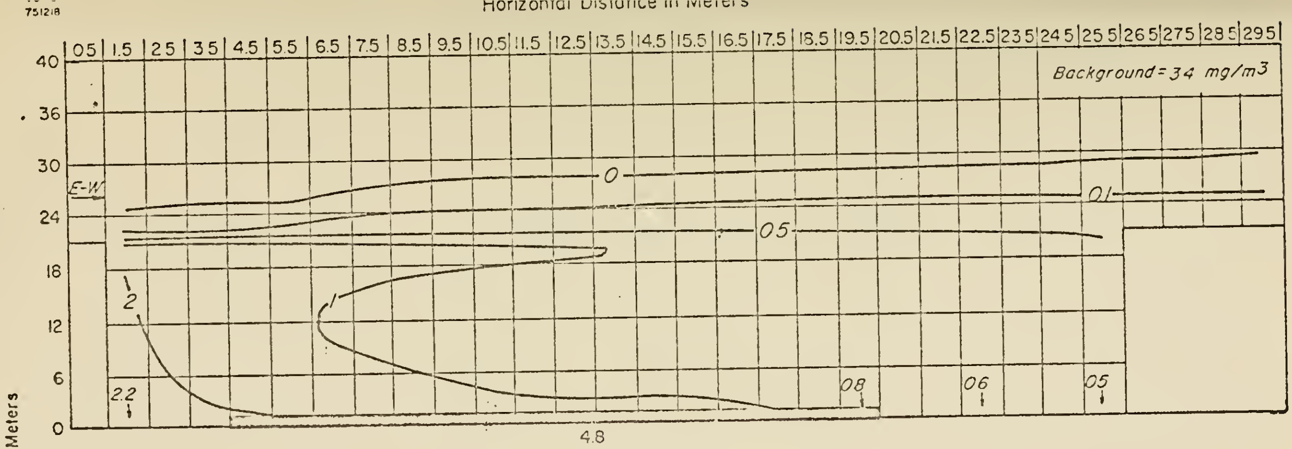

Figure 4-18 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 2 for the Build-2500 (1981) Case, Plan C-2500

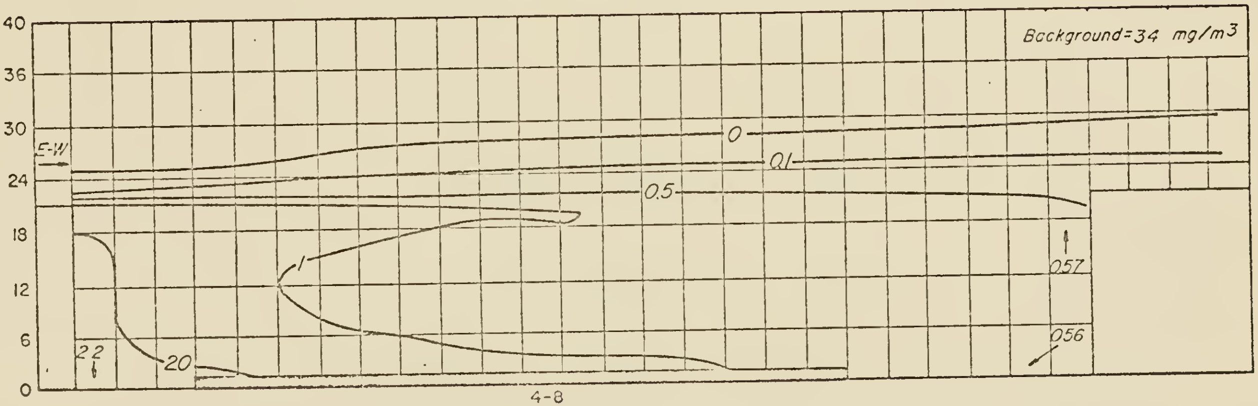

Figure 4-19 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 2 for the Build-1000 (1981) Case, Plan C-1000

TABLE 4-3

CROSS SECTION #3 - TRAFFIC DATA AND RESULTING CO EMISSION SOURCE STRENGTHS USED IN MODELING

	1974		1981						1991					
	Existing	Plan A	No Build	Plan B	Build-2500 Plan C-2500		Build-1000 Plan C-1000		No Build	Plan B	Build-2500 Plan C-2500		Build-1000 Plan C-10	
Link[1]	Volume/ Speed[2]	Source Strength[3]	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Sc Str
							1-Hour							
19-14	470P/7.5[4]	12.607	370P/7.5	2.388	460P/10	2.243	410P/10	2.074	370P/7.5	.915	460P/10	.864	410P/10	[illegible]
19-L	1100P/12.5	17.743	1180P/10	5.762	700P/12.5	2.764	700P/12.5	2.763	1180P/10	2.251	700P/12.5	1.103	700P/12.5	1.
H-14	750A/10.0	15.162	830A/7.5	5.358	1090A/10	5.326	1090A/12.5	4.303	830A/7.5	2.053	1090A/10	2.096	1090A/12.5	1.
G-20	880A/10.0	17.598	-	-	-	-	-	-	-	-	-	-	-	-
16-15	970P/12.5	15.646	1040P/10	5.090	-	-	-	-	1040P/10	1.992	-	-	-	-
15-16	1170A/15.0	15.789	1250A/10	6.104	-	-	-	-	1250A/10	2.355	-	-	-	-
15-20	-	-	940A/10	4.594	2020P/10	9.881	1920A/10	9.391	940A/10	1.811	2020P/10	3.451	1920A/10	3.
22-15	-	-	-	-	1470P/7.5	9.342	1390P/7.5	9.295	-	-	1470P/7.5	3.541	1390P/7.5	3.
15-22	-	-	-	-	1040A/10	4.891	1470A/10	7.178	-	-	1040A/10	1.804	1470A/10	2.
							8-Hour							
19-14	1960/10.0	5.307	1690/10	1.293	2350/12.5	1.454	2010/12.5	1.280	1859/7.5	.955	2585/12.5	.815	2211/12.5	[illegible]
19-L	3300/15.0	5.953	3530/12.5	2.192	3370/15	1.763	3370/15	1.763	4060/12.5	1.301	3576/15	1.080	3376/15	1.
H-14	4370/12.5	9.505	4760/10	3.655	5490/12.5	3.116	5490/15	2.624	5236/7.5	2.690	5490/12.5	1.455	5490/15	1
G-20	4400/12.5	9.512	-	-	-	-	-	-	-	-	-	-	-	-
16-15	4980/15.0	8.802	5330/12.5	3.121	-	-	-	-	6130/12.5	1.764	-	-	-	-
15-16	5820/17.5	8.944	6300/12.5	3.798	-	-	-	-	6300/12.5	1.910	-	-	-	-
15-20	-	-	4840/12.5	3.000	10310/12.5	6.236	9780/12.5	6.091	5324/12.5	1.693	11341/12.5	3.495	10758/12.5	3.
22-15	-	-	-	-	6970/10	4.889	6110/10	4.426	-	-	7667/10	2.529	6721/10	2.
15-22	-	-	-	-	7450/12.5	3.953	6760/12.5	3.716	-	-	7450/12.5	1.741	6760/12.5	1.

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[1] See Figures 8-4 through B-6 of Appendix 8.

[2] Volumes are in vehicles/specified time period.
All speeds are in mi/hr.

[3] Units of mg/m-sec

[4] Denotes whether peak 1-hour occurs in AM or PM.

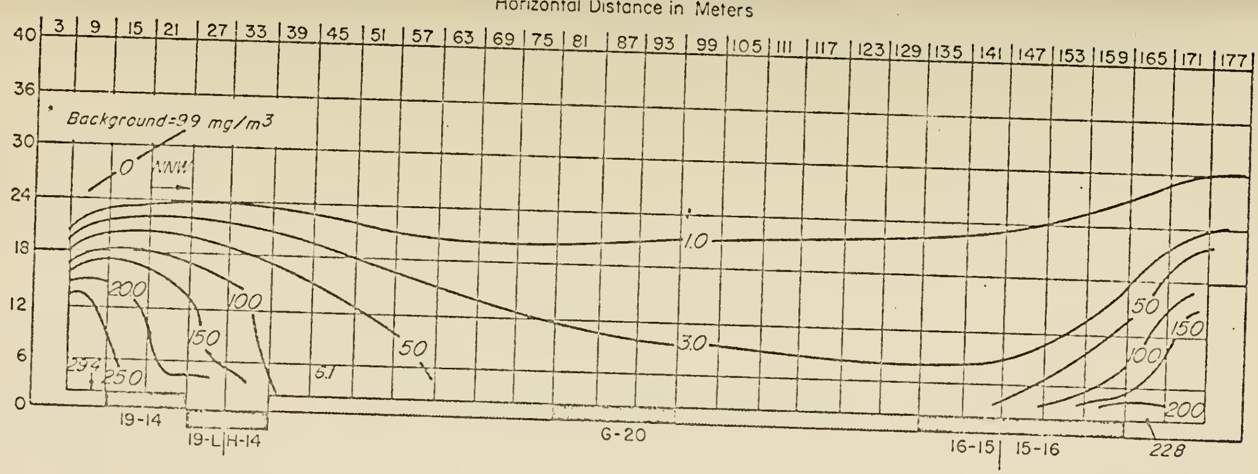

Figure 4-20 Worst Hourly CO Concentration (mg/m^3) at Cross Section 3 for the Existing (1974) Case, Plan A

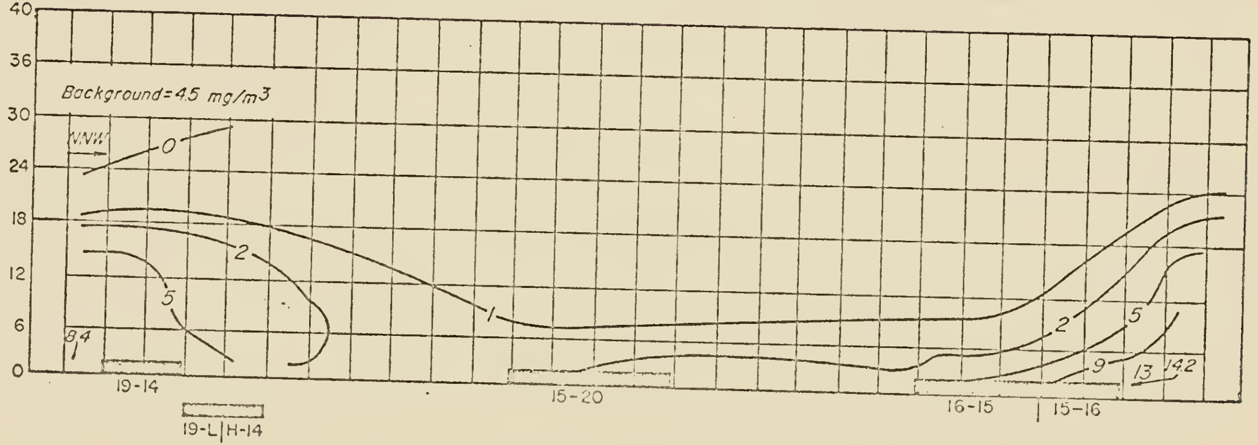

Figure 4-21 Worst Hourly CO Concentration (mg/m^3) at Cross Section 3 for the No-Build (1981) Case, Plan B

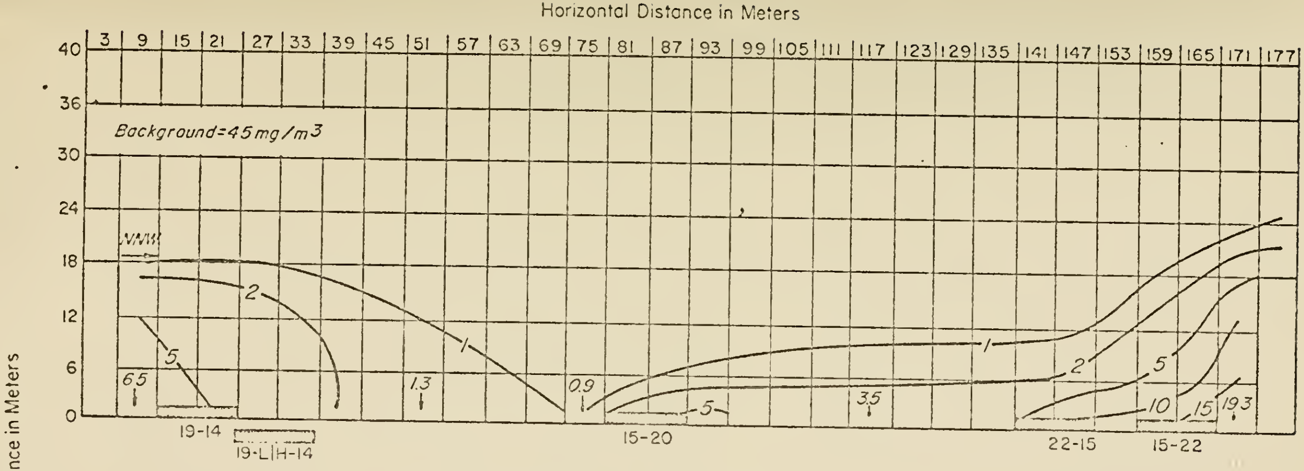

Figure 4-22 Worst Hourly CO Concentration (mg/m^3) at Cross Section 3 for the Build-2500 (1981) Case, Plan C-2500

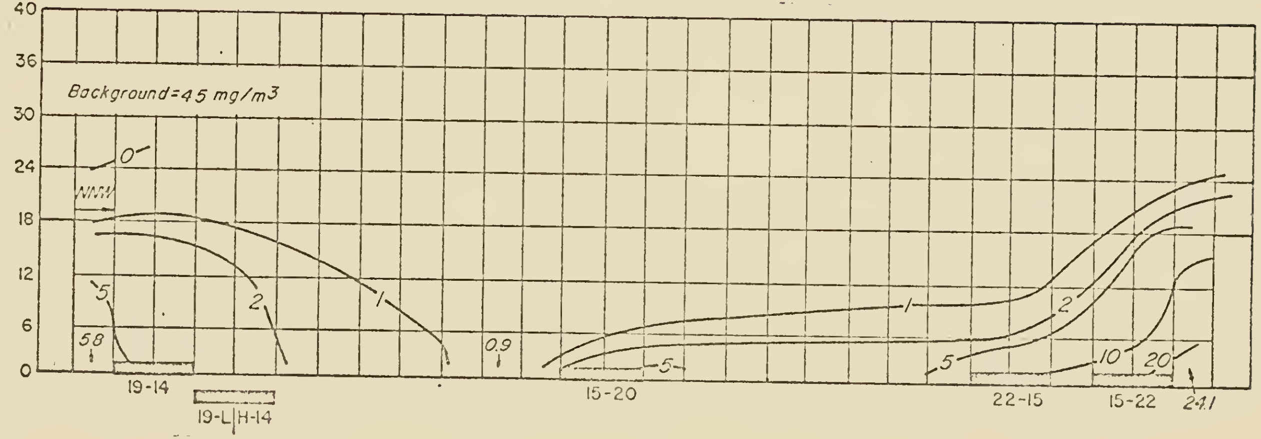

Figure 4-23 Worst Hourly CO Concentration (mg/m^3) at Cross Section 3 for the Build-1000 (1981) Case, Plan C-1000

Purchase St., passes over two expressway ramps, across the parking area between Purchase St. and Atlantic Ave., and continues across the Federal Reserve Bank lot to Summer St. As shown in Figure 4-20, an existing (Plan A) case maximum roadway-generated CO concentration of 29.4 mg/m^3 occurs at the lower upwind corner of the cross section. Concentrations near the Summer St. edge are about 22.8 mg/m^3. With the contribution of the existing 1-hour background (9.9 mg/m^3), a maximum total air quality level of 39.3 mg/m^3 occurs in the existing case. This level is marginally below the 40 mg/m^3 1-hour NAAQS for CO. By 1981 (see Figure 4-21), the maximum total air quality level expected throughout the cross section has been reduced to 18.7 mg/m^3 with the no build case. Plans C-2500 and C-1000 maximum total air quality levels (Figures 4-22 and 4-23) are 23.8 mg/m^3 and 28.6 mg/m^3 in 1981, respectively. These levels are less than 75% of the standard.

8-Hour Analysis

Existing air quality at Cross Section #3 is characterized by a worst 8-hour traffic-related maximum of 10.6 mg/m^3, which without background is already in excess of the 10 mg/m^3 8-hour NAAQS (see Figure 4-24). Adding the existing 7.4 mg/m^3 background results in a maximum total CO level of 18.0 mg/m^3, nearly twice the 8-hour standard. Maximum total levels expected with the no build cases are approximately 10.4 mg/m^3 in 1981 and 7.1 mg/m^3 in 1991 (see Figure 4-25).

The Plan C-2500 (Figure 4-26) and Plan C-1000 (Figure 4-27) cases result in maximum total CO levels of 13.9 mg/m^3 and 13.3 mg/m^3, respectively in 1981. By 1991, these concentrations would be reduced to 8.4 mg/m^3 and 8.3 mg/m^3. Hence, while the maximum total CO levels expected in 1981 are nearly 40% above the applicable standard, the corresponding levels predicted for 1991 are more than 15% below the standard.

4.2.4 Cross Section #4 - Central Artery North of Dewey Sq. Tunnel

Table 4-4 summarizes the traffic data and emission source strengths used in these analyses.

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751229

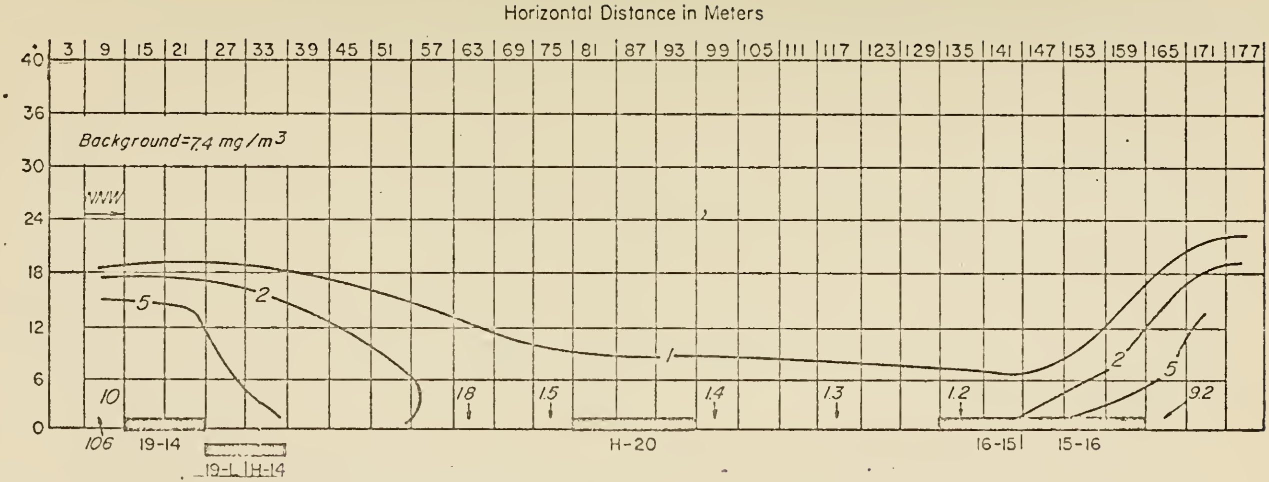


Figure 4-24 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 3 for the Existing (1974) Case, Plan A

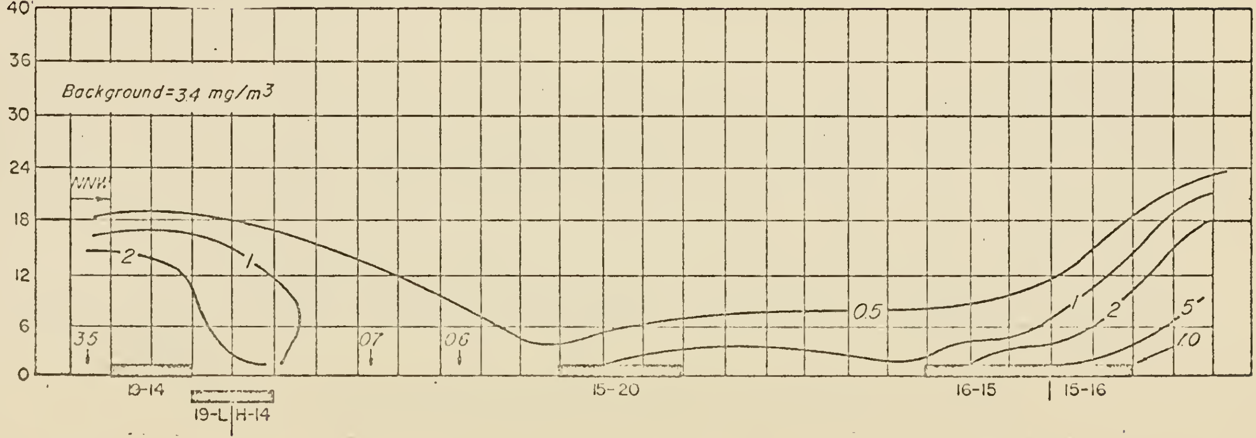
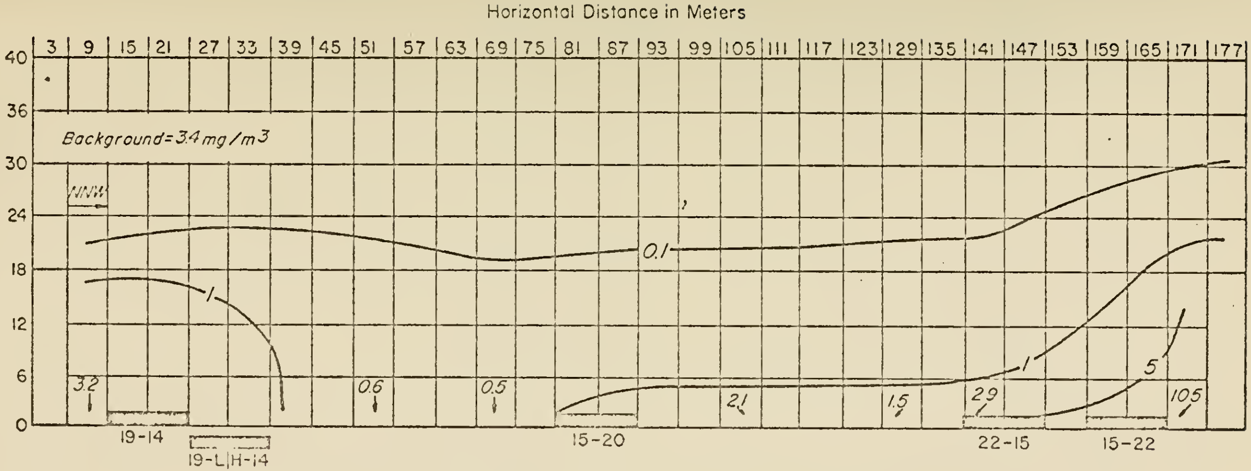


Figure 4-25 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 3 for the No Build (1981) Case, Plan B



Figuro 4-26 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 3 for the Build-2500 (1981) Case, Plan C-2500

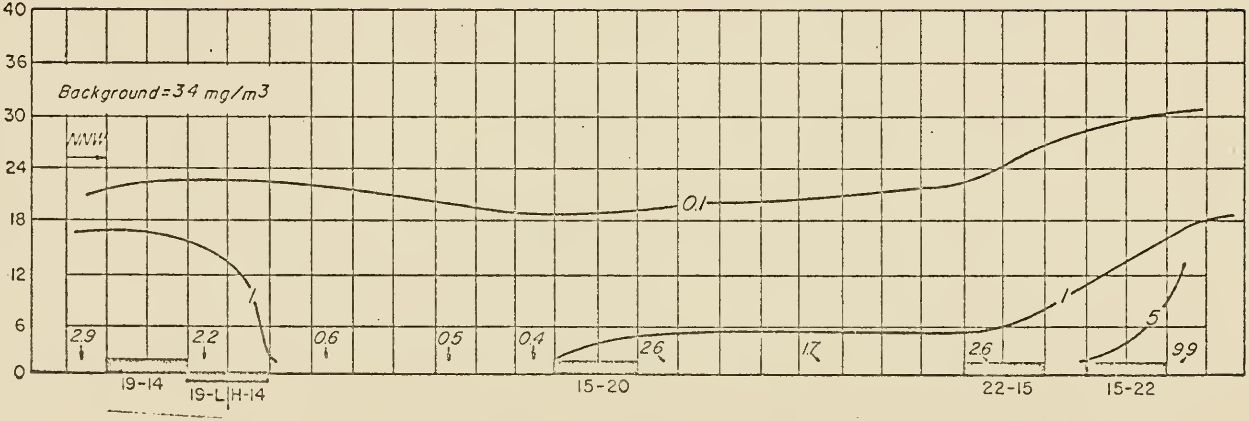


Figure 4-27 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 3 for the Build-1000 (1981) Case, Plan C-1000

TABLE 4-4

CROSS SECTION #4 - TRAFFIC DATA AND RESULTING CO EMISSION SOURCE STRENGTHS USED IN MODELING

	1974				1981						1991			
	Existing	Plan A	No Build	Plan B	Build-2500 Plan C-2500		Build-1000 Plan C-1000		No Build	Plan B	Build-2500 Plan C-2500		Build-1 Plan C-..	
ink[1]	Volume/ Speed[2]	Source Strength[3]	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	[illegible]
							1-Hour							
19	1400P/7.5[4]	37.259	1500P/7.5	9.676	1560P/7.5	10.059	1540P/7.5	9.930	1500P/7.5	3.751	1560P/7.5	3.922	1540P/7.5	[illegible]
14	750A/10	15.16	830A/7.5	5.36	1090A/7.5	5.326	1090A/7.5	5.326	830A/7.5	2.05	1090A/7.5	2.10	1090A/7.5	[illegible]
ery 5B	3770A/10	75.67	4120A/7.5	26.54	4130A/7.5	26.51	4120A/7.5	26.54	4120A/7.5	10.30	4120A/7.5	10.30	4120A/7.5	[illegible]
ery 8	6690A/10	134.28	6740A/715	43.42	6740A/7.5	43.42	6740A/7.5	43.42	6740A/7.5	16.85	6740A/7.5	16.85	6740A/7.5	[illegible]
M	980P/12.5	15.978	1050A/10	5.316	1660P/10	8.120	1660P/10	8.120	1050A/10	2.185	1660P/10	3.231	1660P/10	[illegible]
N	1000A/12.5	16.315	1090A/10	5.519	1120A/10	5.478	1110A/10	5.429	1090A/10	2.268	1120A/10	2.180	1110A/10	[illegible]
							8-Hour							
9	6640/10.0	17.797	7160/10	5.505	7410/10	5.701	7270/10	5.594	8234/10	3.250	8522/10	3.384	8361/10	[illegible]
4	4370/22.5	9.51	4760/10	3.655	5490/12.5	3.12	5490/12.5	3.12	5236/7.5	2.69	5490/12.5	1.48	5490/12.5	[illegible]
ery B	37500/22.5	45.61	41410/20	16.47	414.0/20	16.47	41410/20	16.47	41410/20	8.63	41410/20	8.63	41410/20	[illegible]
ery B	37900/22.5	46.10	42200/20	16.78	37100/20	14.75	37100/20	14.75	42200/20	8.79	37100/20	7.73	37100/20	[illegible]
M	5800/15.0	10.492	6210/12.5	3.849	10890/12.5	6.586	10890/12.5	6.783	7142/12.5	2.271	12524/12.5	3.860	12524/12.5	[illegible]
N	4850/15.0	8.773	5280/12.5	3.273	5650/12.5	3.417	5480/12.5	3.413	6072/12.5	1.930	6488/12.5	2.003	6302/12.5	[illegible]

[1] See Figures B-4 through B-6 of Appendix B.

[2] Volumes are in vehicles/specified time period.
All speeds are in mi/hr.

[3] Units of mg/m-sec.

[4] Denotes whether peak 1-hour occurs in AM or PM.

1-Hour Analysis

The results of the dispersion modeling analysis of worst 1-hour CO concentrations throughout Cross Section #4 are illustrated in Figures 4-28 through 4-31. This cross section, modeled assuming a northeasterly wind, begins at the buildings along the northern edge of Purchase St. and continues across the depressed Central Artery to Atlantic Ave. In the existing case (Figure 4-28), a worst 1-hour roadway-generated CO concentration of 59.2 mg/m^3 is expected at the downwind edge of the cross section, resulting in a maximum total CO level of 69.1 mg/m^3 when the existing 1-hour background is considered. This level is nearly 75% more than the applicable 40 mg/m^3 1-hour NAAQS. However, by 1981 (Figure 4-29) the maximum total air quality level, expected with the C-2500 alternative, has been reduced to 25.3 mg/m^3. Plan C-1000 and Plan B are expected to result in maximum total air quality levels of 25.2 mg/m^3 and 24.2 mg/m^3 respectively (see Figures 4-30 and 4-31). All these 1981 values are well below the standard. Corresponding 1991 levels are all less than 12.7 mg/m^3, 32% of the standard.

8-Hour Analysis

Existing roadway-related worst 1-hour CO levels resulting throughout Cross Section #4 are presented in Figure 4-32. A maximum traffic-generated CO level of 24.3 mg/m^3 is expected. This value alone (without background) is nearly 2.5 times the 8-hour standard. With the 7.4 mg/m^3 contribution of existing background, the maximum total CO level in the cross section, 31.7 mg/m^3, is more than 3 times the NAAQS. Maximum total air quality levels associated with Plan B in 1981 (see Figure 4-33) are expected to be approximately 12.3 mg/m^3 about 25% greater than the standard. Plans C-2500 and C-1000 (Figures 4-34 and 4-35) are expected to produce a maximum total level of 13.2 mg/m^3 less than 33% above the standard. By 1991, all concentrations throughout the cross section are below the 10 mg/m^3 standard.

4.3 Parallel Wind Analyses

When the local wind direction becomes parallel to a roadway, pollutant concentrations may accumulate in the downwind direction. This

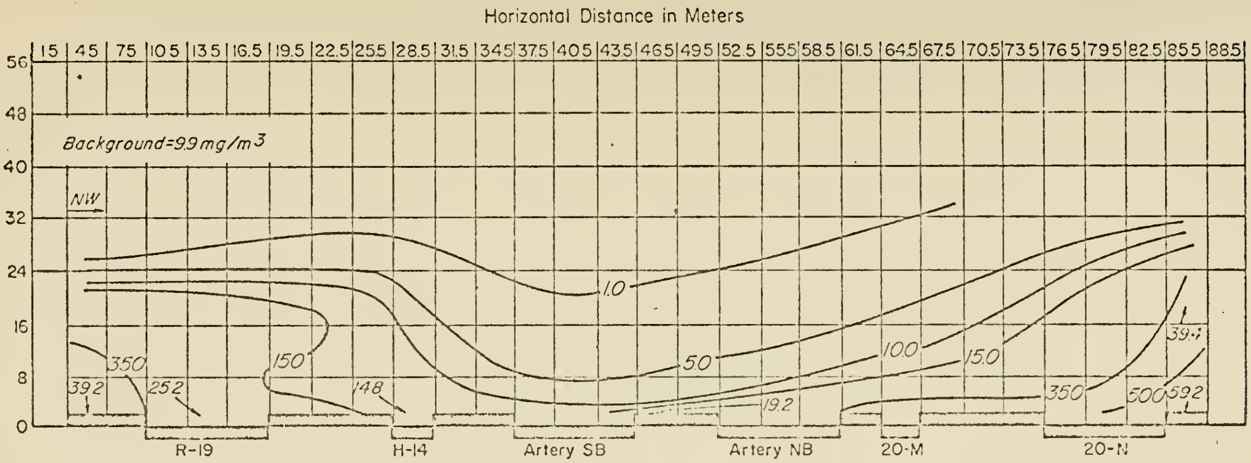


Figure 4-28 Worst Hourly CO Concentration (mg/m^3) at Cross Section 4 for the Existing (1974) Case, Plan A

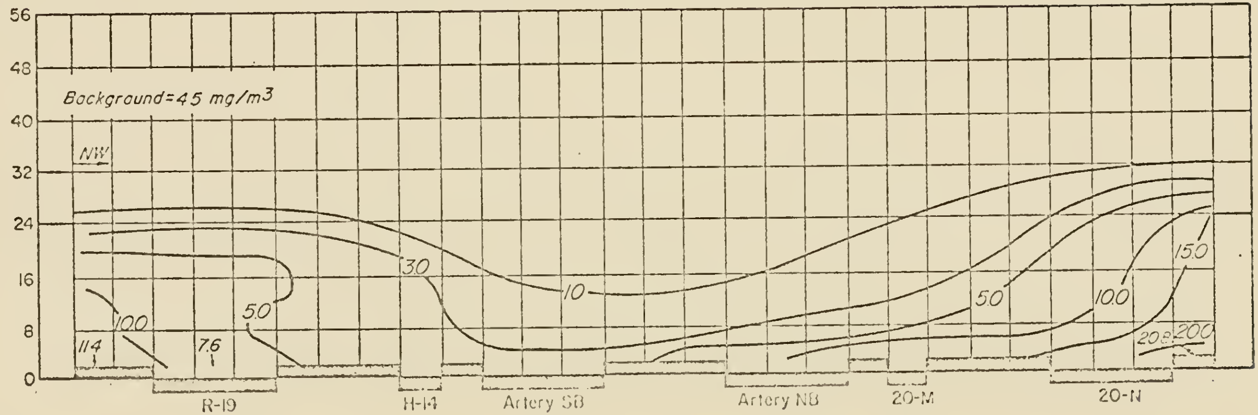


Figure 4-29 Worst Hourly CO Concentration (mg/m^3) at Cross Section 4 for the No Build (1981) Case, Plan B

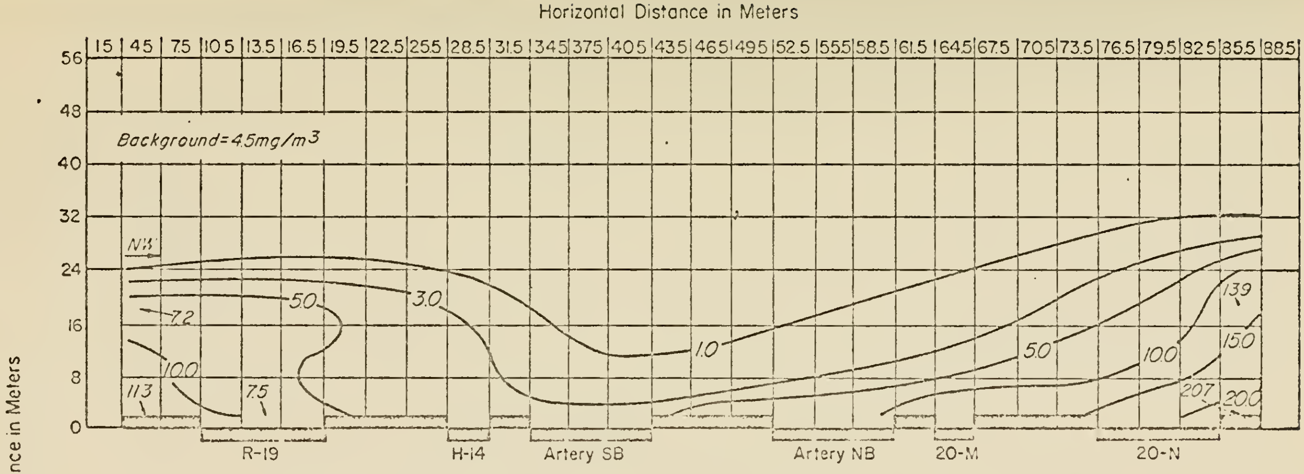


Figure 4-30 Worst Hourly CO Concentration (mg/m^3) at Cross Section 4 for the Build-2500 (1981) Case, Plan C-2500

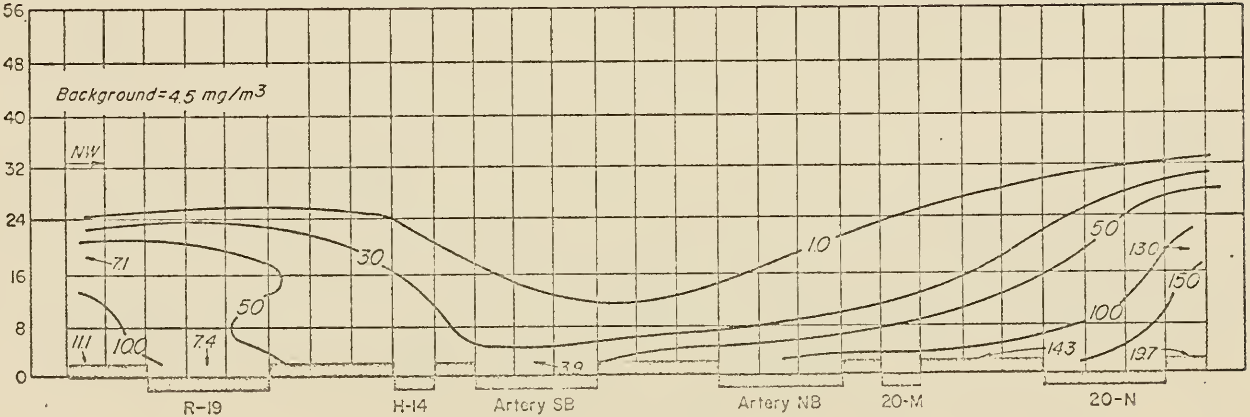


Figure 4-31 Worst Hourly CO Concentration (mg/m^3) at Cross Section 4 for the Build-1000 (1981) Case, Plan C-1000

4-21

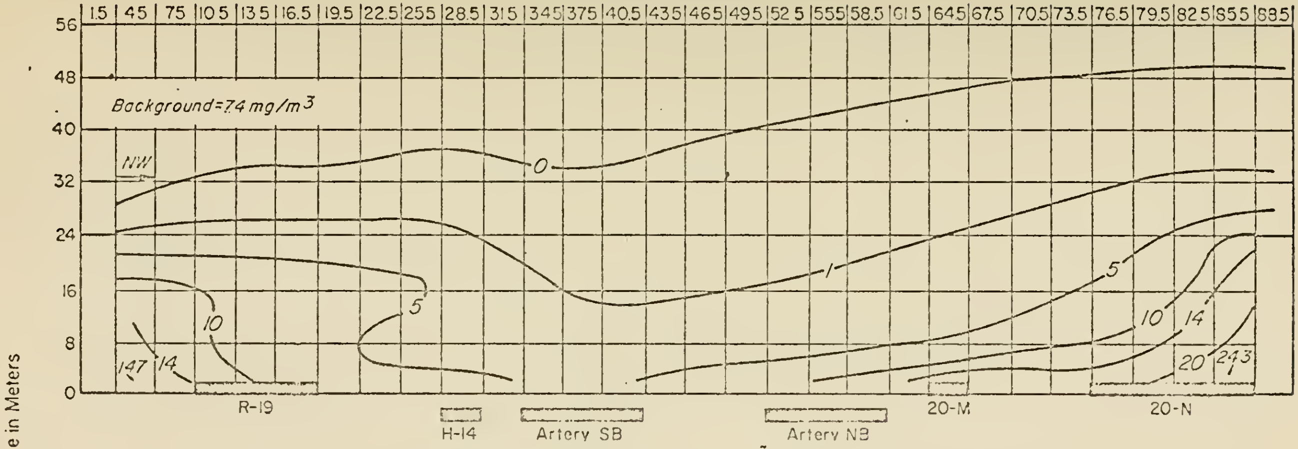


Figure 4-32 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 4 for the Existing (1974) Case, Plan B

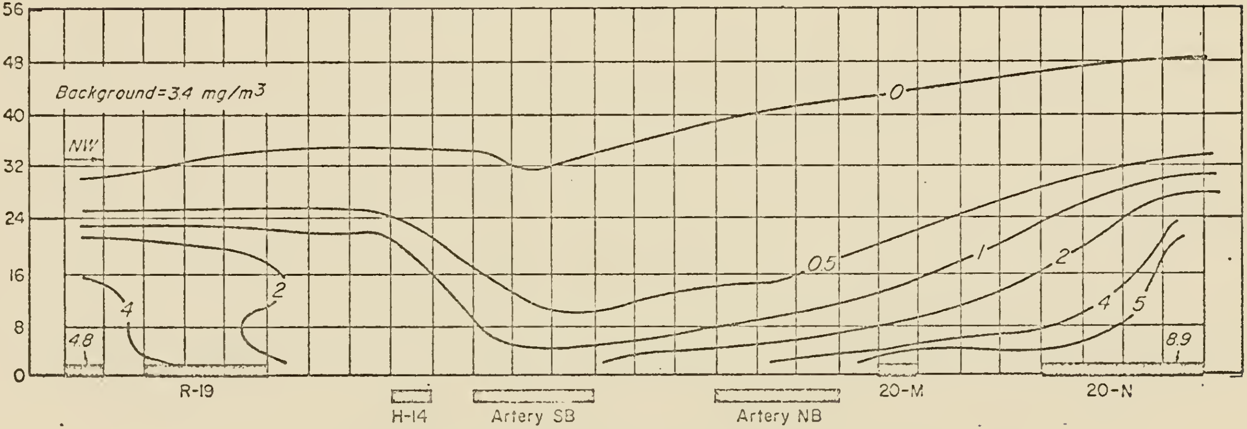


Figure 4-33 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 4 for the No- Build (1981) Case, Plan B

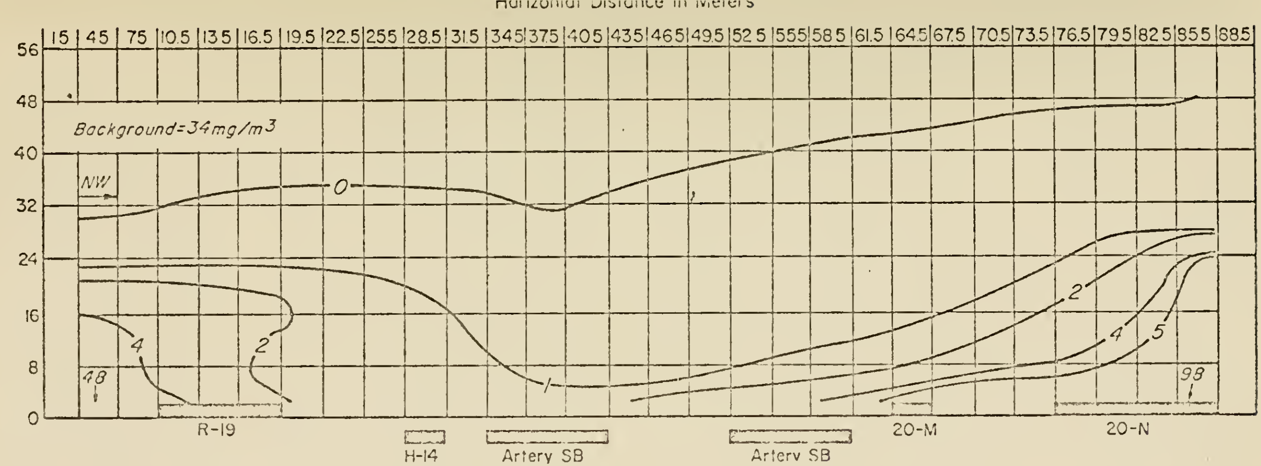


Figure 4-34. Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 4 for the Build-2500 (1981) Case, Plan C-2500

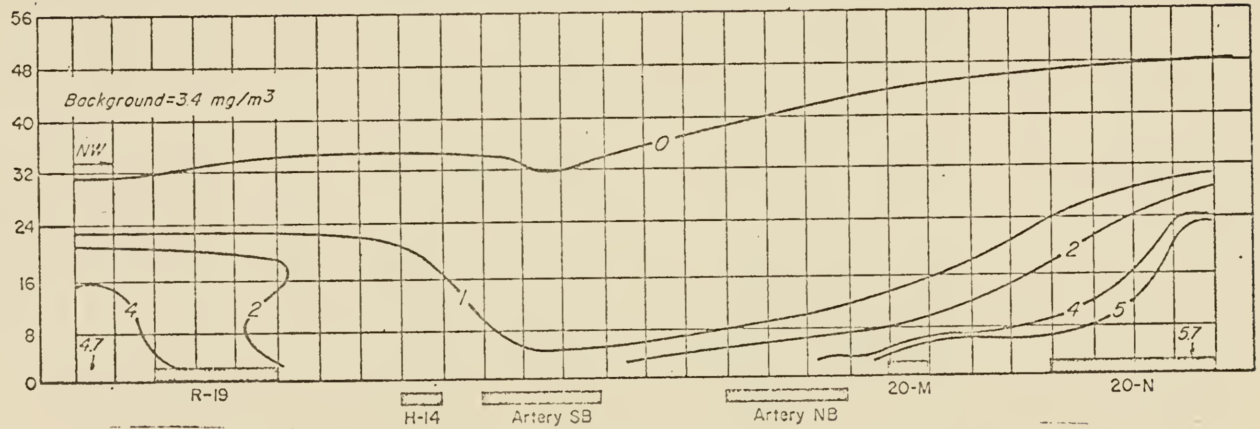


Figure 4-35 Worst 8-Hour CO Concentration (mg/m^3) at Cross Section 4 for the Build-1000 (1981) Case, Plan C-1000

accumulation begins at the point where the wind initially becomes parallel to the roadway and continues until the two are no longer parallel. This situation has been analyzed for two of the most heavily travelled roadways in the project area - Kneeland Street and Summer Street - using an area source model derived from the work of Gifford and Hanna (1971). A discussion of the model and its application is presented in Section D.3 of Appendix D.

4.3.1 Kneeland Street

Assuming a 2 m/sec west northwest wind blowing parallel to Kneeland Street from Whitmore Street toward Atlantic Avenue and the traffic data outlined in Table 4-5, 1- and 8-hour ground-level CO concentrations expected to result from each project alternative were determined for a receptor located along the easterly corner of Kneeland Street and Atlantic Avenue. Table 4-6 displays the results of this analysis. All concentrations, except the existing 8-hour value, are below the NAAQS for each averaging period.

4.3.2 Summer Street

The results of a similar analysis of Summer Street from the eastern boundary of the project area to the intersection of Summer and High Streets, using the traffic data in Table 4-7, are shown in Table 4-8 for a ground-level receptor located at the intersection. Again, all predicted CO levels, are well below the applicable standards with the exception of the existing 8-hour value of 11.0 mg/m^3, slightly in excess of the 10 mg/m^3 8-hour standard.

4.4 Effects of Interim Standard Extension and Non-Implementation of the TCP.

It is important to note that the emission source strengths calculated in Appendix B assume the current (March 5, 1975) form of the FMVCP (see Table 1-2) and the MBIAQCR TCP as proposed in the February 28, 1975 Federal Register. EPA has indicated that the interim CO and HC standards established for 1977 model year may be extended through 1979 and beyond, with the original statutory standards of 3.4 g/mi CO and .41

TABLE 4-5

PARALLEL WIND ANALYSIS OF KNEELAND STREET - TRAFFIC DATA AND RESULTING CO EMISSION SOURCE STRENGTHS USED IN MODELING

	1974		1981						1991					
					Build-2500		Build-1000				Build-2500		Build-1000	
	Existing	Plan A	No Build	Plan B	Plan C-2500		Plan C-1000		No Build	Plan B	Plan C-2500		Plan C-1000	
Link[1]	Volume/ Speed[2]	Source Strength[3]	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength
							1-Hour							
A-1	1060P[4]/7.5	28.099	860P/7.5	5.545	1210P/5	11.546	1230P/5	11.659	860P/7.5	2.168	1210P/5	4.478	1230P/5	4.592
1-A	710P/5.0	28.137	760P/5	7.267	1010P/5	9.651	1020P/5	10.107	760P/5	2.800	1010P/5	3.727	1020P/5	4.116
1-2	240P/7.5	6.387	270A/7.5	1.741	980P/5	9.364	910A/5	9.002	270A/7.5	0.677	980P/5	3.616	910A/5	3.685
2-1	740A/7.5	19.694	840P/7.5	5.417	980P/5	9.371	740P/5	7.320	840P/7.5	2.106	980P/5	3.611	740P/5	2.996
2-3	440A,P/10.0	8.831	540A/7.5	3.483	1600P/5	15.289	1530P/5	14.615	540A/7.5	1.354	1600P/5	5.904	1530P/5	5.650
3-2	660P/10.0	13.247	790P/7.5	5.085	940P/5	8.988	700P/7.5	4.513	790P/7.5	1.981	940P/5	3.464	700P/7.5	1.762
3-4	780A/15.0	10.494	900A/12.5	3.556	2020A/5	19.290	2020A/5	19.296	900A/12.5	1.421	2020A/5	7.454	2020A/5	7.460
4-3	520P/12.5	8.358	630P/10	3.078	550P/5	5.259	310P/7.5	2.218	630P/10	1.207	550P/5	2.027	310P/7.5	1.010
							8-Hour							
A-1	6300/10.0	16.316	6880/10	4.830	8040/7.5	7.433	7490/7.5	7.148	6880/10	2.289	8040/7.5	3.499	7490/7.5	3.481
1-A	5140/7.5	17.704	5500/7.5	5.087	6700/7.5	6.196	6200/7.5	5.734	5500/7.5	2.384	6700/7.5	2.904	6200/7.5	2.690
1-2	1540/10.0	4.003	1790/10	1.256	5800/7.5	5.363	5250/7.5	5.010	1969/5	1.252	6380/5	4.037	5775/5	3.932
2-1	4840/10.0	12.579	5320/10	3.734	5580/7.5	5.160	5120/7.5	4.886	6118/5	3.891	6417/5	4.031	5888/5	4.001
2-3	3070/12.5	6.416	3440/10	2.414	9260/7.5	8.562	8710/7.5	8.312	3936/10	1.312	10649/7.5	4.625	10017/7.5	4.636
3-2	2400/12.5	5.016	2800/10	1.965	3740/7.5	3.458	3280/5	2.378	3220/5	2.048	4301/5	2.735	3772/5	2.568
3-4	3910/17.5	5.810	4320/15	2.004	7430/7.5	6.692	7340/7.5	6.569	4968/15	1.081	8545/7.5	3.515	8441/7.5	3.420
4-3	1820/15.0	3.184	2090/13.5	1.186	2050/7.5	1.895	1590/10	1.189	2404/10	0.798	2358/7.5	1.022	1829/7.5	0.907

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[1] See Figures B-4 through B-6 of Appendix B

[2] Volumes are in vehicles/specified time period
All speeds are in mi/hr

[3] Units of [illegible]

[4] Denotes whether peak 1 hour [illegible]

TABLE 4-6

EXPECTED GROUND-LEVEL CONCENTRATION[1] (MG/M^3) DUE TO WIND PARALLEL TO KNEELAND STREET

Case		1-Hour	8-Hour
1974 Existing - Plan A		25.5	16.5*
1981 No Build - Plan B		8.6	6.2
1981 Build - 2500	- Plan C	13.9	8.3
1981 Build - 1000		13.1	8.0
1991 No Build - Plan B		6.1	5.0
1991 Build - 2500	- Plan C	8.1	6.1
1991 Build - 1000		7.9	6.0

[1] Includes appropriate background as determined in Section 3.

	1-Hour	8-Hour
1974	9.9	7.4
1981, 1991 All Cases	4.5	3.4

* indicates concentrations in excess of applicable standards

TABLE 4-7

PARALLEL WIND ANALYSIS OF SUMMER STREET - TRAFFIC DATA AND RESULTING CO EMISSION SOURCE STRENGTHS USED IN MODELING

	1974		1981						1991					
					Build-2500		Build-1000				Build-2500		Build-1000	
	Existing	Plan A	No Build	Plan B	Plan C-2500		Plan C-1000		No Build	Plan B	Plan C-2500		Plan C-1000	
Link[1]	Volume/ Speed[2]	Source Strength[3]	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength	Volume/ Speed	Source Strength
							1-Hour							
16-1	590A/15.0	7.962	630A/17.5	1.791	650A/17.5	1.933	670A/17.5	1.914	630A/17.5	0.706	680A/17.5	0.762	670A/17.5	0.765
I-16	970P/15.0	13.129	1040A/15	3.429	1100A/12.5	4.324	1060P/12.5	4.167	1040A/15	1.343	1100A/12.5	1.684	1060P/12.5	1.623
15-16	1170A/15.0	15.789	1250A/10	6.104	-	-	-	-	1250A/10	2.385	-	-	-	-
16-15	970P/12.5	15.646	1040P/10	5.080	-	-	-	-	1040P/10	1.992	-	-	-	-
22-15	-	-	-	-	1470P/7.5	9.342	1390P/7.5	9.295	-	-	1470P/7.5	3.541	1390P/7.5	3.819
15-22	-	-	-	-	1040A/10	4.891	1470A/10	7.178	-	-	1040A/10	1.804	1470A/10	2.805
14-15	900A/10.0	18.124	1060A/5	10.160	690A/7.5	4.286	410A/7.5	2.644	1060A/5	3.886	690A/7.5	1.567	410A/7.5	1.032
15-14	550P/7.5	15.497	620P/5	5.939	1060P/7.5	6.836	890P/7.5	5.951	620P/5	2.276	1060P/7.5	2.658	890P/7.5	2.445
14-13	-	-	350A/5	3.224	1060P/5	10.138	1020A/5	10.107	350A/5	1.168	1060P/5	3.906	1020A/5	4.116
13-14	300A/7.5	8.015	-	-	160P/7.5	0.994	160P/7.5	1.032	-	-	160P/7.5	0.363	160P/7.5	0.400
							8-Hour							
16-1	3060/17.5	4.750	3270/20	1.306	3870/20	1.546	3580/20	1.424	3761/17.5	0.895	4451/17.5	1.057	4117/17.5	0.969
I-16	5700/17.5	8.826	6100/17.5	2.761	6580/15	3.443	6290/15	3.455	7015/17.5	1.670	7567/17.5	1.801	7234/17.5	1.844
15-16	5820/17.5	8.944	6300/12.5	3.798	-	-	-	-	6300/12.5	1.910	-	-	-	-
16-15	4980/15.0	8.802	5330/12.5	3.121	-	-	-	-	6130/12.5	1.764	-	-	-	-
22-15	-	-	-	-	6970/10	4.889	6110/10	4.426	-	-	7667/10	2.529	6721/10	2.378
15-22	-	-	-	-	7450/12.5	3.953	6760/12.5	3.716	-	-	7430/12.5	1.741	6760/12.5	1.714
14-15	4330/12.5	9.078	5450/7.5	5.044	2790/10	1.831	2200/10	1.545	5995/7.5	2.576	3069/10	0.879	2420/10	0.809
15-14	3160/10.0	8.413	3380/7.5	3.329	6290/10	4.607	5950/10	4.578	3718/5	2.677	6919/10	2.595	6545/10	2.599
14-13	-	-	2310/7.5	1.999	7690/7.5	7.112	7470/7.5	7.129	2657/7.5	0.950	8459/7.5	3.667	8217/7.5	3.819
13-14	1510/10.0	4.020	-	-	1170/10	0.768	1170/10	0.874	-	-	1287/10	0.369	1287/10	0.483

[1] See Figures B-4 through B-6 of Appendix B

[2] Volumes are in vehicles/specified time period
All speeds are in mi/hr

[3] Units of mg/m-sec

[4] Denotes whether peak 1-hour occurs in AM or PM

TABLE 4-8

EXPECTED GROUND-LEVEL CO CONCENTRATION[1] (MG/M^3) DUE TO WIND PARALLEL TO SUMMER STREET

Case		1-Hour	8-Hour
1974 Existing - Plan A		16.2	11.0*
1981 No Build - Plan B		6.9	4.8
1981 Build - 2500	- Plan C	7.4	5.3
1981 Build - 1000		7.4	5.2
1991 No Build - Plan B		5.4	4.2
1991 Build - 2500	- Plan C	5.6	4.4
1991 Build - 1000		5.7	4.4

[1] Includes appropriate background as determined in Section 3.

	1-Hour	8-Hour
1974	9.9	7.4
1981, 1991 All Cases	4.5	3.4

* indicates concentrations in excess of applicable standards

g/mi HC to be achieved as late as the 1982 model year. In addition, the final form of the MBIAQCR TCP has not been announced, and considerable doubt remains as to the implementability of the control measures proposed. As a result, future emission source strengths of vehicles in the South Station area may be significantly larger than those calculated in Appendix B, increasing both projected background and predicted roadway-generated CO levels. Table 4-9 presents the projected effects of extending the interim CO emission standards beyond the 1977 model year on predicted total CO levels, both with and without the emission reductions expected from the TCP. The effect of each eventuality outlined above on predicted CO concentrations may then be determined by multiplying the predicted CO levels presented and discussed in the previous sections by the appropriate factor from Table 4-9.

The results of applying these mutliplicative factors to the predicted minimum total CO concentrations presented and discussed in Sections 4.2 and 4.3 are summarized in Tables 4-10 through 4-15. A review of these tables indicates that the effect on the predicted maximum total CO levels could be significant with either or both of the following situations occurring in some cases:

1. Maximum total ambient CO levels predicted to be in excess of the standards are further aggravated or,

2. Maximum total ambient CO levels predicted to be below the applicable standards are now exacerbated to levels in excess of the standards.

In Table 4-10, the effects within the Kneeland Street Canyon (cross section #1) are:

1. 8-hour concentrations predicted to be in excess of the 10 mg/m^3 standard for the no-build and both build options are further aggravated. For the most severe possibility (extension of the interim standard to 1982 and without the TCP), the build options show maximum levels about twice the 10 mg/m^3 standard, while the no-build alternative indicates a maximum level more than 1.5 times the standard.

TABLE 4-9

PROJECTED EFFECT OF EXTENDING INTERIM VEHICLE EMISSION STANDARDS BEYOND 1977 ON PREDICTED CO LEVELS, BOTH WITH AND WITHOUT PROPOSED TCP CONTROLS*

Extension of Interim Standard To	Approximate Multiplicative Effect on Predicted CO Levels			
	1981		1991	
	With TCP Controls	Without TCP Controls	With TCP Controls	Without TCP Controls
1977	1.00	1.30	1.00	1.15
1978	1.07	1.32	1.02	1.16
1979	1.15	1.42	1.03	1.17
1980	1.23	1.52	1.05	1.20
1981	1.28	1.56	1.11	1.26
1982	-	-	1.23	1.40

* TCP control measures include (see Appendix B)

(a) Inspection and Maintenance Program

(b) VSAD Retrofit

(c) Air Bleed Retrofit

TABLE 4-10

SUMMARY OF EXPECTED CO LEVELS AT CROSS SECTION #1

1-Hour

Case		Maximum Traffic Generated Level	Background	Predicted Maximum Total CO Levels (mg/m^3) with Interim Emission Standards Extended to											
				1977		1978		1979		1980		1981		1982	
				With TCP[1]	W/O TCP	With	W/O	With	W/O	With	W/O	With	W/O	With	W/O
1974 Existing Plan A[2]		45.6*	9.9	55.5*	NOT APPLICABLE										
1981 No Build Plan B		11.3	4.5	15.8	20.5	16.9	20.9	18.2	22.4	19.4	24.0	20.2	24.6	--	--
1981 Build - 2500	Plan C	18.5	4.5	23.0	29.9	24.6	30.4	26.5	32.7	28.3	35.0	29.4	35.9	--	--
1981 Build - 1000		19.0	4.5	23.5	30.6	25.1	31.0	27.0	33.4	28.9	33.7	30.1	36.7	--	--
1991 No Build Plan B		4.4	4.5	8.9	10.2	9.1	10.3	9.2	10.4	9.3	10.7	9.9	11.2	10.9	12.5
1991 Build - 2500	Plan C	7.2	4.5	11.7	13.5	11.9	13.6	12.1	13.7	12.3	14.0	13.0	14.7	14.4	16.4
1991 Build - 1000		7.6	4.5	12.1	13.9	12.3	14.0	12.5	14.2	12.7	14.5	13.4	15.2	14.9	16.9
8-Hour															
1974 Existing Plan A[2]		22.1*	7.4	29.5*	NOT APPLICABLE										
1981 No Build Plan B		6.9	3.4	10.3*	13.4*	11.0*	13.6*	11.8*	14.6*	12.7*	15.7*	13.2*	16.1*	--	--
1981 Build - 2500	Plan C	9.5	3.4	12.9*	16.8*	13.8*	17.0*	14.8*	18.3*	15.9*	19.6*	16.5*	20.1*	--	--
1981 Build - 1000		9.0	3.4	12.4*	16.1*	13.3*	16.4*	14.3*	17.6*	15.3*	18.8*	15.9*	19.3*	--	--
1991 No Build Plan B		3.2	3.4	6.6	7.6	6.7	7.7	6.8	7.7	6.9	7.9	7.3	8.3	8.1	9.2
1991 Build - 2500	Plan C	4.4	3.4	7.8	9.0	8.0	9.0	8.0	9.1	8.2	9.4	8.7	9.8	9.6	10.9*
1991 Build - 1000		4.3	3.4	7.7	8.9	7.9	8.9	7.9	9.0	8.1	9.2	8.5	9.7	9.5	10.8*

Notes:

[1] as assumed in Appendix B and the discussion in this section

[2] extension of interim standards does not effect 1974 results

* indicates concentrations in excess of applicable standards

TABLE 4-11

SUMMARY OF EXPECTED CO LEVELS AT CROSS SECTION #2

1-HOUR

Case	Maximum Traffic Generated Level	Background	Predicted Maximum Total CO Levels (mg/m^3) with Interim Emission Standards Extended to											
			1977		1978		1979		1980		1981		1982	
			With TCP[1]	W/O TCP	With	W/O	With	W/O	With	W/O	With	W/O	With	W/O
1974 Existing - Plan A[2]	7.4	9.9	17.3	NOT APPLICABLE										
1981 No Build - Plan B	2.7	4.5	7.2	9.4	7.7	9.5	8.3	10.2	8.9	10.9	9.2	11.2	--	--
1981 Build-2500 - Plan C	3.5	4.5	8.0	10.4	8.6	10.6	9.2	11.4	9.8	12.2	10.2	12.5	--	--
1981 Build-1000	3.4	4.5	7.9	10.3	8.5	10.4	9.1	11.2	9.7	12.0	10.1	12.3	--	--
1991 No-Build - Plan B	1.1	4.5	5.6	6.4	5.7	6.5	5.8	6.6	5.9	6.7	6.2	7.1	6.9	7.8
1991 Build-2500 - Plan C	1.5	4.5	6.0	6.9	6.1	7.0	6.2	7.0	6.3	7.2	6.7	7.6	7.4	8.4
1991 Build-1000	1.5	4.5	6.0	6.9	6.1	7.0	6.2	7.0	6.3	7.2	6.7	7.6	7.4	8.4

8-HOUR

Case	Maximum Traffic Generated Level	Background	1977 With TCP[1]	1977 W/O TCP	1978 With	1978 W/O	1979 With	1979 W/O	1980 With	1980 W/O	1981 With	1981 W/O	1982 With	1982 W/O
1974 Existing - Plan A[2]	2.9	7.4	10.3*	NOT APPLICABLE										
1981 No-Build - Plan B	1.3	3.4	4.7	6.1	5.0	6.2	5.4	6.7	5.8	7.1	6.0	7.3	--	--
1981 Build-2500 - Plan C	2.2	3.4	6.6	8.6	7.1	8.7	7.6	9.4	8.1	10.0	8.4	10.3*	--	--
1981 Build-1000	2.2	3.4	6.6	8.6	7.1	8.7	7.6	9.4	8.1	10.0	8.4	10.3*	--	--
1991 No-Build - Plan B	0.7	3.4	4.1	4.7	4.2	4.8	4.2	4.8	4.3	4.9	4.6	5.2	5.0	5.7
1991 Build-2500 - Plan C	1.1	3.4	4.5	5.2	4.6	5.2	4.6	5.3	4.7	5.4	5.0	5.7	5.5	6.3
1991 Build-1000	1.1	3.4	4.5	5.2	4.6	5.2	4.6	5.3	4.7	5.4	5.0	5.7	5.5	6.3

Notes:

[1] as assumed in Appendix B and the discussion in this section

[2] extension of interim standards does not effect 1974 results

TABLE 4-12

SUMMARY OF EXPECTED CO LEVELS AT CROSS SECTION #3

1-Hour

			Predicted Maximum Total CO Levels (mg/m^3) with Interim Emission Standards Extended to											
			1977		1978		1979		1980		1981		1982	
Case	Maximum Traffic Generated Level	Background	With TCP[1]	W/O TCP	With	W/O	With	W/O	With	W/O	With	W/O	With	W/O
1974 Existing - Plan A[2]	29.4	9.9	39.3	NOT APPLICABLE										
1981 No Build - Plan B	14.2	4.5	18.7	24.3	20.0	24.7	21.5	26.6	23.0	28.4	23.9	29.2	----	----
1981 Build - 2500 - Plan C	19.3	4.5	23.8	30.9	25.5	31.4	27.4	33.8	29.3	36.2	30.5	36.8	----	----
1981 Build - 1000	24.1	4.5	28.6	37.2	30.6	37.8	32.9	40.6*	35.2	43.5*	36.6	44.6*	----	----
1991 No Build - Plan B	5.5	4.5	10.0	11.5	10.2	11.6	10.3	11.7	10.5	12.0	11.1	12.6	12.3	14.0
1991 Build - 2500 - Plan C	7.3	4.5	11.8	13.6	12.0	13.7	12.2	13.8	12.4	14.2	13.1	14.9	14.5	16.5
1991 Build - 1000	9.5	4.5	14.0	16.1	14.3	16.2	14.4	16.4	14.7	16.8	15.5	17.6	17.2	19.6
8-Hour														
1974 Existing - Plan A[2]	10.6*	7.4	18.0*	NOT APPLICABLE										
1981 No Build - Plan B	7.0	3.4	10.4*	13.5*	11.1*	13.7*	12.0*	14.8*	12.8*	15.8*	13.3*	16.2*	----	----
1981 Build - 2500 - Plan C	10.5*	3.4	13.9*	18.1*	14.9*	18.3*	16.0*	19.7*	17.1*	21.1*	17.8*	21.7*	----	----
1981 Build - 1000	9.9	3.4	13.3*	17.3*	14.2*	17.6*	15.3*	18.9*	16.4*	20.2*	17.0*	20.7*	----	----
1991 No Build - Plan B	3.7	3.4	7.1	8.2	7.2	8.2	7.3	8.3	7.5	8.5	7.9	8.9	8.7	9.9
1991 Build - 2500 - Plan C	5.0	3.4	8.4	9.7	8.6	9.7	8.7	9.8	8.8	10.1*	9.3	10.6*	10.3*	11.8*
1991 Build - 1000	4.9	3.4	8.3	9.5	8.5	9.6	8.5	9.7	8.7	10.0	9.2	10.5*	10.2*	11.6*

Notes:

[1] as assumed in Appendix B and the discussion in this section

[2] extension of interim standards does not effect 1974 results

*indicates concentrations in excess of applicable standards

TABLE 4-13

SUMMARY OF EXPECTED CO LEVELS AT CROSS SECTION #4

1-Hour

Case	Maximum Traffic Generated Level	Background	Predicted Maximum Total CO Levels (mg/m^3) with Interim Emission Standards Extended to 1977 With TCP[1]	1977 W/O TCP	1978 With	1978 W/O	1979 With	1979 W/O	1980 With	1980 W/O	1981 With	1981 W/O	1982 With	1982 W/O
1974 Existing - Plan A[2]	59.2*	9.9	69.1*	NOT APPLICABLE										
1981 No Build - Plan B	19.7	4.5	24.2	31.5	25.9	31.9	27.8	34.4	29.8	36.8	31.0	37.8	--	--
1981 Build - 2500 } - Plan C	20.8	4.5	25.3	32.9	27.1	33.4	29.1	35.9	31.1	38.5	32.4	39.5	--	--
1981 Build - 1000	20.7	4.5	25.2	32.8	27.0	33.3	29.0	35.8	31.0	38.3	32.3	39.3	--	--
1991 No Build - Plan B	7.9	4.5	12.4	14.3	12.6	14.4	12.8	14.5	13.0	14.9	13.8	15.6	15.3	17.4
1991 Build - 2500 } - Plan C	8.2	4.5	12.7	14.6	13.0	14.7	13.1	14.9	13.3	15.2	14.1	16.0	15.6	17.8
1991 Build - 1000	8.2	4.5	12.7	14.6	13.0	14.7	13.1	14.9	13.3	15.2	14.1	16.0	15.6	17.8
8-Hour														
1974 Existing - Plan A[2]	24.3*	7.4	31.7*	NOT APPLICABLE										
1981 No Build - Plan B	8.9	3.4	12.3*	16.0*	13.2*	16.2*	14.1*	17.5*	15.1*	18.7*	15.7*	19.2*	--	--
1981 Build - 2500 } - Plan C	9.8	3.4	13.2*	17.2*	14.1*	17.4*	15.2*	18.7*	16.2*	20.1*	16.9*	20.6*	--	--
1981 Build - 1000	9.8	3.4	13.2*	17.2*	14.1*	17.4*	15.2*	18.7*	16.2*	20.1*	16.9*	20.6*	--	--
1991 No Build - Plan B	5.1	3.4	8.5	9.8	8.7	9.9	8.8	9.9	8.9	10.2*	9.4	10.7*	10.5*	11.9*
1991 Build - 2500 } - Plan C	5.5	3.4	8.9	10.2*	9.1	10.3*	9.2	10.4*	9.3	10.7*	9.9	11.2*	10.9*	12.5*
1991 Build - 1000	5.7	3.4	9.1	10.5*	9.3	10.6*	9.4	10.6*	9.6	10.9*	10.1*	11.5*	11.2*	12.7*

Notes:

[1] as assumed in Appendix B and the discussion in this section

[2] extension of interim standards does not effect 1974 results

[*] indicates concentrations in excess of applicable standards

TABLE 4-14

SUMMARY OF EXPECTED CO LEVELS DUE TO WIND PARALLEL TO KNEELAND STREET

Case		Maximum Traffic Generated Level	Background	Predicted Maximum Total CO Levels (mg/m^3) with Interim Emission Standards Extended to											
				1977		1978		1979		1980		1981		1982	
				With TCP[1]	W/O TCP	With	W/O	With	W/O	With	W/O	With	W/O	With	W/O
1-Hour															
1974 Existing-Plan A[2]		15.6	9.9	25.5	NOT APPLICABLE										
1981 No Build-Plan B		4.1	4.5	8.6	11.2	9.2	11.4	9.9	12.2	10.6	13.1	11.0	13.4	--	--
1981 Build - 2500	- Plan C	9.4	4.5	13.9	18.1	14.9	18.3	16.0	19.7	17.1	21.1	17.8	21.7	--	--
1981 Build - 1000		8.6	4.5	13.1	17.0	14.0	17.3	15.1	18.6	16.1	19.9	16.8	20.4	--	--
1991 No Build-Plan B		1.6	4.5	6.1	7.0	6.2	7.1	6.3	7.1	6.4	7.3	6.8	7.7	7.5	8.5
1991 Build - 2500	- Plan C	3.6	4.5	8.1	9.3	8.3	9.4	8.3	9.5	8.5	9.7	9.9	10.2	10.0	11.3
1991 Build - 1000		3.4	4.5	7.9	9.1	8.1	9.2	8.1	9.2	8.3	9.5	8.8	10.0	9.7	11.1
8-Hour															
1974 Existing-Plan A[2]		9.1	7.4	16.5*	NOT APPLICABLE										
1981 No Build-Plan B		2.8	3.4	6.2	8.1	6.6	8.2	7.1	8.8	7.6	9.3	7.9	9.7	--	--
1981 Build - 2500	- Plan C	4.9	3.4	8.3	10.8*	8.9	11.0*	9.5	11.8*	10.2*	12.6*	10.6*	12.9*	--	--
1981 Build - 1000		4.6	3.4	8.0	10.4*	8.6	10.6*	9.2	11.4*	9.8	12.2*	10.2*	12.5*	--	--
1991 No Build-Plan B		1.6	3.4	5.0	5.8	5.1	5.8	5.2	5.9	5.3	6.0	5.6	6.3	6.2	7.0
1991 Build - 2500	- Plan C	2.7	3.4	6.1	7.0	6.2	7.1	6.3	7.1	6.4	7.3	6.8	7.7	7.5	8.5
1991 Build - 1000		2.6	3.4	6.0	6.9	6.1	7.0	6.2	7.0	6.3	7.2	6.7	7.6	7.4	8.4

Notes:

[1] as assumed in Appendix B and the discussion in this section

[2] extension of interim standards does not effect 1974 results

* indicates concentrations in excess of applicable standards

TABLE 4-15

SUMMARY OF EXPECTED CO LEVELS DUE TO WIND PARALLEL TO SUMMER STREET

1-Hour

Case	Maximum Traffic Generated Level	Background	Predicted Maximum Total CO Levels (mg/m^3) with Interim Emission Standards Extended to											
			1977		1978		1979		1980		1981		1982	
			With TCP[1]	W/O TCP	With	W/O	With	W/O	With	W/O	With	W/O	With	W/O
1974 Existing-Plan A[2]	6.3	9.9	16.2	NOT APPLICABLE										
1981 No Build-Plan B	2.4	4.5	6.9	9.9	7.4	9.1	7.9	9.8	8.5	10.5	8.8	10.8	--	--
1981 Build - 2500 - Plan C	2.9	4.5	7.4	9.6	7.9	9.8	8.5	10.5	9.1	11.2	9.5	11.5	--	--
1981 Build - 1000	2.9	4.5	7.4	9.6	7.9	9.8	8.5	10.5	9.1	11.2	9.5	11.5	--	--
1991 No Build - Plan B	0.9	4.5	5.4	6.2	5.5	6.3	5.6	6.3	5.7	6.5	6.0	6.8	6.6	7.6
1991 Build - 2500 - Plan C	1.1	4.5	5.6	6.4	5.7	6.5	5.8	6.6	5.9	6.7	6.2	7.1	6.9	7.8
1991 Build - 1000	1.2	4.5	5.7	6.6	5.8	6.6	5.9	6.7	6.0	6.8	6.3	7.2	7.0	8.0

8-Hour

Case	Maximum Traffic Generated Level	Background	1977 With TCP[1]	1977 W/O TCP	1978 With	1978 W/O	1979 With	1979 W/O	1980 With	1980 W/O	1981 With	1981 W/O	1982 With	1982 W/O
1974 Existing-Plan A[2]	3.6	7.4	11.0*	NOT APPLICABLE										
1981 No Build-Plan B	1.4	3.4	4.8	6.2	5.1	6.3	5.5	6.8	5.9	7.3	6.1	7.5	--	--
1981 Build - 2500 - Plan C	1.9	3.4	5.3	6.9	5.7	7.0	6.1	7.5	6.5	8.1	6.8	8.3	--	--
1981 Build - 1000	1.8	3.4	5.2	6.8	5.6	6.9	6.0	7.4	6.4	7.9	6.7	8.1	--	--
1991 No Build-Plan B	0.8	3.4	4.2	4.8	4.3	4.9	4.3	4.9	4.4	5.0	4.7	5.3	5.2	5.9
1991 Build - 2500 - Plan C	1.0	3.4	4.4	5.1	4.5	5.1	4.5	5.1	4.6	5.3	4.9	5.5	5.4	6.2
1991 Build - 1000	1.0	3.4	4.4	5.1	4.5	5.1	4.5	5.1	4.6	5.3	4.9	5.5	5.4	6.2

Notes:

[1] as assumed in Appendix B and the discussion in this section

[2] extension of interim standards does not effect 1974 results

* indicates concentrations in excess of applicable standards

2. With the most extreme possibly for 1991 (extension of the interim standard to 1982 and without the TCP), predicted maximum 8-hour CO concentrations for the build options show levels slightly in excess of the 10 mg/m^3 standard. For the no-build case, the corresponding maximum predicted 8-hour concentrations is over 90% of the standard.

In Table 4-11, the effects on Atlantic Avenue between Kneeland and Beach Streets (cross section #2) indicate that predicted 1981 8-hour CO concentrations below the standard could increase to levels slightly or moderately in excess of the 10 mg/m^3 standard for both build options. This would occur if the interim standard were extended to 1980 or later, and the TCP was not implemented.

In Table 4-12, the effects on the Purchase to Summer Street cross-section (cross section #3), are as follows:

1. In 1981, extension of the interim standards to 1979 and beyond without the TCP will aggravate predicted CO levels to slightly above the 40 mg/m^3 standard for the build-1000 alternative only.

2. 8-hour CO levels predicted to be in excess of standards for all alternatives in 1981 are further aggravated. With the most severe possibility (interim standard extension to 1982 and no TCP), maximum levels over twice the standard are indicated for the built options, while the no build alternative indicates a maximum of 1.6 times the 10 mg/m^3 standard.

3. For the build options, extension of the interim standards to 1980 and beyond, without the TCP, will result in predicted 1991 CO levels slightly in excess of the 10 mg/m^3 for the build options. With respect to the no-build option, the predicted 8-hour concentrations approaches the 10 mg/m^3 when the interim standard is extended to 1982 without the TCP.

In Table 4-13 the effects near the Central Artery north of the Dewey Square tunnel are most salient.

1. 1981 8-hour CO levels predicted to be in excess of the standard for all alternatives are further aggravated, and under the most extreme circumstances (interim standards extended to 1982 and no TCP), concentrations are approximately twice the standard for all cases.

2. For the build options, 8-hour CO concentrations in excess of the standard are possible if the interim standards are extended without the TCP until 1977, and with the TCP until 1980. The no build case shows 1991 8-hour concentrations in excess of the standard without the TCP and interim standard extended to 1980, and with the TCP and interim standard extended to 1982.

For the parallel wind analysis on Kneeland Street, predicted 8-hour concentrations associated with the build options will exceed or approach the 10 mg/m^3 standard with the interim standards extended to 1977 and beyond with no TCP, or with the interim standards extended until 1981 even with the TCP. The no build option does not show predicted concentrations in excess of the 8-hour standard. These effects are shown in Table 4-14. For the Summer Street analysis, concentrations in excess of the standards are not expected in 1981 or 1991 under any of the situations indicated in Table 4-15.

5. EMISSIONS BURDEN ANALYSIS

An emission burden is the amount of pollutant produced during a specified time period. For motor vehicle-generated pollutants, the emission burden is merely the sum, over all roadway links considered, of the product of the roadway emission source strength (mg/m-sec) and roadway length (m).

The burden analysis provides a meaningful comparison of project alternatives on a local scale. In this analysis the local scale is defined by the roadway links that constitute the South Station project area. Emissions burdens are calculated for CO, NMHC, and NO_x and are expressed in terms of kilograms (kg) of pollutant per peak 8-hour traffic period. The roadway emission source strengths (mg/m-sec) and link lengths (miles) for each proposed alternative are presented in Tables B-6 through B-12 of Appendix B.

In Table 5-1 the CO, NMHC, and NO_x emission burdens are summarized by alternative for 1981 and 1991. For purposes of trend comparisons, the base year (1974) project area burdens are also presented. These burdens reflect the FMVCP and the full effects of the proposed TCP.[1] However, since the FMVCP and proposed TCP control measures affect each project alternative in approximately the same manner, the relative differences indicated in Table 5-1 would remain unchanged if:

1) the FMVCP is further amended to extend the interim vehicle emission standard beyond 1977, and/or

2) the TCP control measures are not or only partially implemented.

An examination of the results presented in Table 5-1 indicates that the build options result in higher burdens, with the build-2500 option the highest in each year. In absolute terms, the difference between the no build option and build options are small with about a 15% difference between the build-2500 and no build alternatives. The higher emission burdens associated with both build options are due to the increase in project area VMT associated with the options.

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[1] Note that emissions resulting from the Central Artery are not included in emission burden calculations.

TABLE 5-1

CALCULATED 8-HOUR PROJECT AREA EMISSION BURDENS[1]

			CO		HC^2		NO_x	
			kg/Peak 8-Hour Traffic Period	% of Base Year Burden	kg/Peak 8-Hour Traffic Period	% of Base Year Burden	kg/Peak 8-Hour Traffic Period	% of Base Year Burden
1974	Existing	Plan A	1825	-	192	-	94	-
1981	No-Build	Plan B	583	32	77	40	81	86
1981	Build-2500	Plan C-2500	678	37	90	47	94	100
1981	Build-1000	Plan C-1000	655	36	86	45	91	97
1991	No-Build	Plan B	346	19	71	37	75	80
1991	Build-2500	Plan C-2500	382	21	79	41	88	94
1991	Build-1000	Plan C-1000	375	21	80	42	87	93

[1] Central Artery emissions not considered.

[2] For analysis purposes, all vehicular HC is assumed to be NMHC.

However, since the parking spaces associated with each build option are replacement of existing spaces and the regional VMT analysis, performed by Metcalf and Eddy, Inc., indicates that estimated changes in trip patterns associated with the project results in no increase in VMT within the core, the following is implicitly concluded:

1) Build option(s)-related VMT increases in the South Station area are negated by similar VMT decreases in other portions of the core. The net result is no change in Boston core VMT.

2) The CO, NMHC, and NO_x, emission burden increases that result from the build options VMT increases, are negated by equivalent emission burden decreases that accompany the local VMT decreases effected in these other portions of the core region. The overall core emission burdens remain unchanged.

6. TCP VMT COMPATIBILITY ASSESSMENT

This section addresses the compatibility of the proposed project with the VMT-reducing provisions proposed by the EPA that portion of TCP that addresses attainment of the photochemical oxidant standard. In Section 6.1 the TCP oxidant control strategy, including the VMT-reducing measures is discussed, and in Section 6.2 the impact of the project on regional (AQCR) VMT is assessed relative to its compatibility with the TCP and the VMT-reducing measures specifically.

6.1 The TCP as it Pertains to the Attainment of the NAAQS for Photochemical Oxidants

To determine the magnitude and extent of the photochemical oxidant problem in the MBIAQCR, the EPA has examined air quality measurement data collected at several locations within the AQCR. Based on their evaluations there have been several representative second highest oxidant measurements (measured as ozone) at 0.20 parts per million (ppm). The highest level recorded was 0.21 ppm. Since the oxidant standard is written as an hourly 0.08 ppm standard, not to be exceeded more than once per year the EPA selected 0.20 ppm as the design level on which to base its TCP oxidant attainment strategy.

The TCP oxidant strategy uses the 0.20 ppm as input into the linear rollback model (LRM) to determine HC emission reductions necessary within the AQCR to attain the O_x standard. The LRM is essentially the proportional model (PM) discussed in section 3, where excessive air quality levels are assumed proportional or linearly related to emissions within the AQCR. Stated in another manner, the measured excessive air quality level is equivalent in emissions to the regional emission burden for that pollutant or pollutant precursor. The LRM can be expressed in the following algebraic form to determine the percent emission reduction required to attain a standard.

$$\%RR = \frac{DAQ - STD}{DAQ} \times 100$$

where

%RR = Percent Required Pollutant Emission Reduction to Attain the Specified Air Quality Standard

DAQ = Design Air Quality Level

STD = Air Quality Standard Being Addressed

The application of the LRM to the MBIAQCR for attainment of the photochemical oxidant standard, where HC* are the precursors assumed to be linearly related to the excessive 2nd highest .20 ppm measurement indicates that:

$$\%RR = \frac{0.20 - 0.08}{0.20} \times 100 = 60\%$$

Therefore the EPA has proposed to attain the photochemical oxidant standard within the MBIAQCR by effecting a 60% reduction in 1974 AQCR HC emissions. The manner in which the EPA proposes to effect these reductions is summarized in Table 6-1.

Table 6-1 indicates that:

(1) 504,000 kg/day 1974 HC emission burden is equivalent to the 0.20 ppm 2nd highest oxidant level recorded in 1974.

(2) 317,000 kg/day [(0.60 x 504,000) + 14,600] HC emission reductions are required to attain the standard, or 201,600 kg/day is equivalent to the 0.08 ppm standard.

(3) 221,400 kg/day or approximately 70% of the required HC reduction will be effected by controls on stationary sources of HC.

(4) 95,800 kg/day or the remaining 30% will be effected by controls vehicular sources. A more detailed examination of the 30% vehicular reductions indicates that

   a) The FMVCP will account for 51,600 kg/day or about 16.3%.

   b) Inspection and Maintenance will account for 20,500 kg/day or about 6.5%.

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*Note the MBIAQCR TCP addresses HC as precursors to oxidants rather than NMHC. This is an assumption made for strategy development purposes.

TABLE 6-1

EFFECTS OF PROPOSED EPA CONTROL MEASURES TO ATTAIN THE PHOTOCHEMICAL OXIDANT STANDARD

		Kilograms per day
Hydrocarbon reductions required to meet National Ambient Air Quality Standards for photochemical oxidants, from 1974 base emission year		302,400
Hydrocarbon increase from expanded organic solvent use, etc., 1974-77		14,600
Total hydrocarbon reductions required		317,000
Nonvehicular reductions:		
A. Gasoline storage, transfer and marketing regulations		66,200
B. Organic solvent use regulation		155,200
Total reduction - nonvehicular sources		221,400
Vehicular reductions:		
A. Federal motor vehicle emission controls		51,600
B. Inspection and maintenance		20,500
C. Commuter automobile reduction program, supported by State carpool program and preferential bus and carpool efforts		12,200
D. On street parking limitations, and ceiling on off street parking		900
E. Retrofit program, including:		
1. Air bleed devices	8,400	
2. Vacuum spark advance disconnect	2,200	
Total retrofit reductions	10,600	
Total reduction from vehicular sources		95,800
Total reduction from vehicular and nonvehicular sources		317,200

Source: EPA Transportation Control Plan For Metropolitan Boston Air Quality Control Region 38, FR (30960) November 8, 1973.

c) The proposed retrofit devices will account for 10,600 kg/day or approximately 3.3% of the required reduction.

d) VMT reductions induced by the core parking restrictions, and the regional commuter car pooling program will account for 13,100 kg/day or approximately 4.2% of the required reduction. This 4.2% reduction is equivalent to a 14% region-wide VMT reduction from a 1974 base year.

6.2 VMT Compatibility Assessment

6.2.1 VMT Restrictions Imposed by the TCP

In determining compatibility of the proposed project with the oxidant standard attainment strategy, the VMT-reducing provisions must be specifically addressed. Table 6-1 indicates that in 1977, a 14% VMT reduction is necessary. By 1981, the estimated year the proposed project would be completed, the 14% VMT reduction requirement could change since the average HC emissions per vehicle will decrease due to the FMVCP and TCP emission control measures. As a matter of fact, depending upon the manner in which HC emissions are controlled after 1977, Maintenance Air Quality Control Strategies* may permit growth in the AQCR VMT after 1977. A simple expression which is derived from the LRM and relates post-1977 VMT to 1977 VMT is:

$$VMT(F)\ EV(F) + ES(F) = VMT(77)\ EV(77) + ES(77) = 201{,}600 \text{ kg/day} \qquad (6\text{-}1)$$

where

VMT(F) = allowable VMT in some post-1977 year

EV(F) = average HC emissions per vehicle in some post-1977 year

ES(F) = allowable stationary source HC emissions in some post-1977 year

VMT(77) = allowable 1977 VMT

EV(77) = average HC emissions per vehicle in 1977

ES(77) = allowable stationary HC emissions in 1977

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*The Clean Air Act requires EPA to develop Maintenance Air Quality Strategies to maintain the standard after it has been attained.

201,600 kg/day = the AQCR HC emission burden equivalent to the 0.08 ppm standard (derived from LRM, and information in Table 6-1).

Rearranging terms in the above equation,

$$VMT(F) = \frac{VMT(77)\ EV(77) + ES(77) - ES(F)}{EV(F)} \qquad (6-2)$$

For 1981, the estimated year of project completion, equation (6-2) could be solved for many possible combinations of post-1977 VMT and stationary source emissions growth. The two extreme situations which embrace the interval of possibilities are:

(1) The decrease in AQCR HC emissions due to the decrease in the average HC emissions per vehicle will be balanced totally by growth in post-1977 VMT, in which case ES(77) = ES(81) and equation (6-2) reduces to

$$VMT(81) = VMT(77)\,\frac{EV(77)}{EV(81)} = VMT(77)\ (1.6).$$

Under this assumption the 1981 VMT could be allowed to increase 60% over 1977 VMT.

(2) The decrease in AQCR HC emissions due to the decrease in the average HC emissions per vehicle will be balanced totally by increases in stationary source HC emissions yielding

$$VMT(81) = VMT(77).$$

Under this assumption no increase in AQCR VMT would be permitted after 1977.

Thus, in 1981, it is clear from the above that in terms of allowable VMT, two extremes are possible:

(1) a 60% increase over 1977 VMT, or

(2) a 0% increase in VMT from 1977.

6.2.2 Compatibility of the Proposed Project with the Proposed TCP

The parking spaces associated with the build options are replacement for existing spaces which will be eliminated with completion of the project. Thus, since an equal number of spaces will be eliminated, the proposed project will be in conformance with the requirement of the proposed TCP, that will not allow new parking spaces to be constructed unless an equal number are eliminated.

With respect to the VMT implications of the proposed TCP, it is clear from the discussion in Section 6.1.1, that several possible situations exist with respect to allowed VMT in 1981, if the photochemical oxidant standard is to be maintained. These possible situations are limited by the interval defined by the following extremes:

(1) Maintenance of the oxidant standard will permit 1981 VMT to increase over 1977 VMT by 60%. This would require that stationary HC emissions in 1981 equal the stationary HC emissions allowed in 1977.

(2) 1981 VMT would not be allowed to increase over the VMT in 1977. This requires the assumption that any allowable increases in HC emissions consistent with maintaining the standard would be allocated to stationary sources of HC.

A VMT evaluation relative to the proposed project indicates that based on estimated changes in trip patterns, regional (AQCR) VMT will not increase, and as a matter of fact will decrease slightly. Clearly, this assessment of regional VMT impact is compatible with the implications contained in the TCP. More precisely, it is consistent with the most extreme requirement that no growth in VMT would be permitted after 1977, since the project itself has been identified as a non-generator of regional VMT.

7. QUALITATIVE ANALYSES

Qualitative assessments of the potential air quality impact of Alternatives 4 and 5 (see Section 1.4) have been made to complement the detailed air quality analyses of Alternatives 1, 2, and 3 discussed in the preceeding sections of this report. Alternative 4 is the Federal Highway Administration (FHWA) "minimal build" alternative to TAC scheme 18c, with no garage or intercity bus terminal ramps to or from the Massachusetts Turnpike and Southeast Expressway. Alternative 5 represents a variation of the preferred build alternatives (Alternatives 1 and 2) which includes the construction of a hotel (FAR 10) rather than an office building (FAR 14) on parcel C-5, opposite the proposed facility (see Figure 1-1). The air quality significance of the FHWA minimal build alternative is addressed in the next section, followed by a discussion of the implications of Alternative 5 in Section 7.2.

7.1 Evaluation of Alternative 4

Based on a quantitative traffic evaluation performed by Metcalf and Eddy, Inc., the FHWA minimal build alternative is expected to increase traffic volumes and reduce speeds on a majority of the roadways connecting intersections 1 through 8 (see Figure B-6) with the remainder of the South Station area. These traffic flow modifications can be directly attributed to the increased vehicle load imposed on local surface arteries under the minimal build option. Without direct garage access and entering facility, vehicles leaving the project area via the Massachusetts Turnpike or Southeast Expressway must proceed along Kneeland Street to reach the existing turnpike and expressway ramps. Similarly, expressway vehicles entering the project area must use local surface arteries to reach the facility. With Alternative 4, projected volumes and speeds in other areas of the project will remain unchanged from their build-2500 (Plan C-2500) values.

The higher emission source strengths that would result from the larger traffic volumes and lower speeds associated with Alternative 4 would further increase CO levels expected along Kneeland Street and

its contiguous roadway network. As indicated in Tables 4-10 and 4-14, the vehicle load associated with the build-2500 alternative may result in worst case 8-hour CO levels in excess of the applicable NAAQS in 1981 along Kneeland Street. These CO concentrations would be increased, and the resulting air quality levels exacerbated with the minimal build option. Since projected volumes and speeds in other areas of the project are expected to remain unchanged, air quality levels associated with Alternative 4 in these areas should not vary significantly from the levels expected with the build-2500 alternative.

7.2 Evaluation of Alternative 5

Alternative 5 includes the construction of a hotel with a FAR 10 rather than an office building with a FAR 14 on parcel C-5. Since a FAR value alone is insufficient to determine the final shape (width, length, height) and orientation of each structure, this analysis will assume that both proposed structures are approximately square (length = width) and occupy equal portions of the space available on parcel C-5. Hence, the office building would be about 40% taller than the hotel. Assuming that each option will generate equal amounts of vehicular traffic, these options may be compared from an air quality viewpoint by considering the effects of each obstacle on local wind flow patterns. Normally, wind flow is disturbed both upwind and downwind of an obstruction, with the size of the effected region proportional to the size of the obstacle. In urban areas, however, this effect is complicated by the presence of other obstacles (buildings) which alter the local wind flow in their vicinity. Therefore, only general trends associated with the construction of a taller (or shorter) building may be discussed.

A decrease in street-level wind speeds is generally associated with increased building height for streets in the downwind wake region of an obstruction. This may result in an overall decrease in street-level ventilation and an increase in ground-level pollutant concentrations. However, those areas outside the downwind wake region may experience higher ground-level wind speeds as a result of the increased wind channeling produced by the larger obstruction. Thus, a taller structure

increases the range of expected street-level wind speeds. Depending on the relative orientation of the obstacle, nearby roadways, and the local wind flow, CO levels can be expected to exhibit similar variability, increasing in some areas and decreasing in others.

As indicated, much of the above depends on the spatial relationships between the proposed construction and local CO sources. In addition, other construction in the vicinity of parcel C-5 may, for several wind directions, oppose or enhance the effects described above. Hence, a definitive evaluation of the proposed construction options on parcel C-5 is not possible at this time.

APPENDIX A

HEALTH EFFECTS OF AUTOMOTIVE POLLUTANTS

The following paragraphs outlining the adverse effects of each automotive pollutant have been abstracted from the printed notes from Seminars on Air Pollution from Motor Vehicles presented in 1972 by John H. Ludwig of EPA and from the Air Quality Criteria Documents.(8,9,10,11)

A.1 Carbon Monoxide

Carbon monoxide is absorbed by the lungs and reacts primarily with hemoprotein and most notably with the hemoglobin of the circulating blood. The absorption of CO is associated with a reduction in the oxygen-carrying capacity of the blood and in the readiness with which the blood gives up oxygen to the tissues. Continuous exposure to levels as low as 10 to 35 mg/m^3 (9-30 ppm) of CO over an 8-hour period has been associated with impairment of visual and time interval discrimination, and physiological stress in patients with heart disease. Blood carboxyhemoglobin levels of about 2.5% are associated with the detrimental effects of CO; such a level could result from exposure to over 40 mg/m^3 for one hour or more. Plants are relatively insensitive to CO at the lower levels of concentration that have been found to be toxic for animals.

A.2 Hydrocarbons and Oxidants

There is presently no indication of any direct health effects of the gaseous hydrocarbons in ambient air on populations, although as reactants in photochemical processes hydrocarbons can indirectly be linked with the adverse health effects of photochemical oxidants. Injury to sensitive plants has been reported in association with ethylene, a hydrocarbon, in concentrations of from 1.15 to 575 $\mu g/m^3$ (0.001 to 0.5 ppm) over a period of 8 to 24 hours.

Photochemical oxidants are chemical products resulting principally from atmospheric reactions involving hydrocarbons, oxides of nitrogen, and ultraviolet radiation from sunlight which are detrimental to biological systems and destructive to certain materials.

Adverse health effects, as shown by impairment of performance of student athletes, have occurred over a range of hourly average oxidant concentrations from 60 to 590 $\mu g/m^3$ (0.040 to 0.30 ppm). An increased frequency of attacks in a small proportion of asthmatics has been shown on days when oxidant concentrations exceeded peak values of 250 $\mu g/m^3$ (0.127 ppm) a level that would be associated with an hourly average hydrocarbon concentrations ranging from 100 to 120 $\mu g/m^3$ (0.05 to 0.06 ppm). Eye irritation has been reported in several studies when photochemical oxidant concentrations reached instantaneous levels of about 200 $\mu g/m^3$ (0.10 ppm).

Adverse effects on sensitive vegetation have been observed from exposure to photochemical oxidant concentrations of about 100 $\mu g/m^3$ (0.05 ppm) for 4 hours. Adverse effects on materials from exposure to photochemical oxidants have not been precisely quantified, but have been observed at the levels presently occurring in many urban atmospheres. These effects include the cracking of rubber and rubber products, the fading of certain dyes, and the degradation of several types of synthetic fabrics.

A.3 Nitrogen Oxides

Oxides of nitrogen in ambient air are predominantly in two forms: NO and NO_2. NO is not considered to have adverse health effects at concentrations found in the atmosphere. Its importance relates to its ability to undergo oxidation to NO_2, principally in photochemical reactions also involving hydrocarbons. In this latter form it presents a threat to health. NO_2 exerts its primary toxic effect on the lungs. Long-term exposure to levels between 120-160 $\mu g/m^3$ (0.06 to 0.09 ppm) of NO_2 have been associated with increased incidence of acute bronchitis in infants and school children. No adverse effects have been associated with short-term exposure to NO_2 at levels which have been observed to occur in ambient air.

Adverse effects on vegetation such as leaf abscission and decreased yield of navel oranges have been observed during prolonged fumigation at NO_2 levels of 470 $\mu g/m^3$ (0.25 ppm). Nitrate compounds have also been identified with corrosion and failure of electrical components in metropolitan areas with average NO_x levels of 125 to 150 $\mu g/m^3$ (0.07 to 0.08 ppm).

APPENDIX B

VEHICULAR EMISSIONS

B.1 Calculation of Vehicular Emissions

Emission source strengths in units of mass of pollutant per unit length of roadway per unit time (mg/m-sec) are necessary for input into the ERT urban dispersion models and for emissions burden calculations. These roadway source strengths represent the contribution, during the assumed averaging periods, of each model year vehicle's emission strength weighted by the relative frequency of each model year in the vehicle population. In an attempt to produce the most accurate evaluation of motor vehicle emissions, line source emission rates of carbon monoxide (CO), exhaust hydrocarbons (HC-EX), evaporative hydrocarbons (HC-EV), and nitrogen oxides (NO_x) were calculated using the emission factors for running gasoline and diesel vehicles presented in the EPA technical documents "Attachment No. 1 for Compilation of Air Pollutant Emission Factors - Second Edition", October, 1974 (draft)(12) and "An Interim Report on Motor Vehicle Emission Estimation", October, 1973.(13)

The calculation scheme can be expressed algebraically by the following equation:

$$e_{npv} = s_{pv} \sum_{i = n-z}^{n+1} c_{inpv} \, m_{iv} \qquad \text{(B-1)}$$

where

e_{npv} = the population weighted emission rate in grams per vehicle mile (g/veh-mi) for calendar (analysis) year n, pollutant p, and vehicle type v,

c_{inpv} = the 1975 Federal test procedure emission factor (g/veh-mi) of pollutant p for the i^{th} model year vehicle of type v in calendar year n,

m_{iv} = the weighted annual travel of the i^{th} model year vehicle of type v,

s_{pv} = the speed correction factor for pollutant p and vehicle type v, and

z = number of years in the vehicle population.

Once e_{npv} has been determined for the four pollutants and each vehicle type, an emission source strength in units of mg/m-sec can be determined for the prescribed combination of vehicles using the roadway:

$$E_{np} = V\ B \sum_{v=1}^{N} e_{npv}\ X_v \qquad \text{(B-2)}$$

where

E_{np} = the roadway emission source strength of pollutant p for calendar year n in mg/m-sec,

X_v = fraction of vehicle population that are vehicle type v (total of N types),

V = roadway volume in vehicles per hour,

B = conversion factor from g/veh-mi to mg/m-sec (1.726×10^{-4}),

and e_{npv} is as defined in equation (B-1). The following paragraphs describe, in detail, the application of these equations to the calculation of emission source strengths in the South Station project area.

An emission factor (g/veh-mi) for each pollutant was used for each vehicle model year and vehicle type. While Attachment No. 1 presents emission factors for six vehicle types,

(1) Light duty gasoline vehicles
(2) Light duty gasoline trucks
(3) Light duty diesel vehicles
(4) Heavy duty gasoline vehicles
(5) Heavy duty diesel vehicles
(6) Motorcycles

the conservative assumptions that (1) all light duty vehicles (LDV's) were gasoline-powered, (2) all gasoline-powered trucks were heavy duty gasoline vehicles (HDG's), and (3) all diesel vehicles were heavy duty diesel vehicles (HDD's) were employed in this study. Thus, LDV exhaust emission factors for the 1974 calendar year were extracted from Table 1-3 of Attachment No. 1. Since exhaust emission factors are only given for the calendar years 1973-1980, 1985 and 1990, deterioration data listed in Section 1.3 of Attachment No. 1 was used to derive LDV exhaust emission factors for the calendar years 1981 and 1991. LDV evaporative

emission factors were obtained from Table 11 of "An Interim Report on Motor Vehicle Emission Estimation". HDG exhaust emission factors for the 1974 analysis year were extracted from Table 4-2 of Attachment No. 1. 1981 and 1991 calendar year HDG exhaust emission factors were determined using the deterioration data in Section 4.3 of Attachment No. 1. HDG evaporative emission factors were obtained from Table 11 of "An Interim Report ...". HDD exhaust emission factors for NO_x were obtained from Table 5-2 of Attachment No. 1 for the 1974 analysis year, and from Tables 5-2 through 5-7 and data in Section 5.3 for the 1981 and 1991 analysis years. Single HDD CO, HC-EX, and HC-EV emission factors were applied for all analysis years. Additionally, all LDV emission factors were adjusted to reflect the March 5, 1975 extension of the CO and HC-EX interim motor vehicle emission standards through the 1977 model year. A summary of the LDV, HDG and HDD emission factors used in this analysis is presented in Table B-1.

A vehicle population (a percentage breakdown by model year of the vehicles in use in the region) for both light duty and heavy duty vehicles as of July 1, 1971 was derived from registration statistics furnished in a memo from EPA Region I.(14) These population percentages were then weighted by the average annual miles traveled by the i^{th} model year vehicle, by the following formula, to produce the m_{iv} values used in equation (B-1):

$$m_{iv} = \frac{f_{iv} D_{iv}}{\sum_i f_{iv} D_{iv}} \qquad \text{(B-3)}$$

where

m_{iv} = the weighted annual travel of the i^{th} model year vehicle of vehicle type v,

f_{iv} = fraction of the i^{th} model year vehicles of type v in use on July 31 of any year,

D_{iv} = average annual miles traveled by the i^{th} model year vehicle of type v by July 31 of any year.

Appropriate values of D_i for light-duty vehicles and all heavy-duty vehicles were obtained from Table 1-22 of Attachment No. 1 and

TABLE B-1

LIGHT DUTY VEHICLE, HEAVY DUTY GAS VEHICLE, AND HEAVY DUTY DIESEL VEHICLE EMISSION FACTORS (g/veh-mi)

1974 - Existing Case

	LDV				HDG			
	CO	HC-EX	HC-EV	NO_x	CO	HC-EX	HC-EV	NO_x
≤ 1962	95.00	8.90	7.10	3.34	203.00	14.40	8.20	13.00
1963	95.00	8.90	3.80	3.34	203.00	14.40	8.20	13.00
1964	95.00	8.90	3.80	3.34	203.00	14.40	8.20	13.00
1965	95.00	8.90	3.80	3.34	203.00	14.40	8.20	13.00
1966	95.00	8.90	3.80	3.34	203.00	14.40	8.20	13.00
1967	95.00	8.90	3.80	3.34	203.00	14.40	8.20	13.00
1968	70.60	7.40	3.00	4.32	203.00	14.40	8.20	13.00
1969	68.40	5.80	3.00	5.08	203.00	14.40	8.20	13.00
1970	58.50	5.80	3.00	4.35	188.00	14.00	8.20	12.70
1971	56.00	4.70	0.50	4.30	188.00	13.90	3.00	12.70
1972	41.00	3.80	0.20	4.55	188.00	13.80	3.00	12.60
1973	39.00	3.50	0.20	3.30	188.00	13.70	3.00	12.60
1974	39.00	3.20	0.20	3.10	167.00	13.10	3.00	12.50

1981 - All Cases

	LDV				HDG			
	CO	HC-EX	HC-EV	NO_x	CO	HC-EX	HC-EV	NO_x
1965	99.00	9.30	3.80	3.34	203.00	14.40	8.20	13.00
1966	99.00	9.30	3.80	3.34	203.00	14.40	8.20	13.00
1967	99.00	9.30	3.80	3.34	203.00	14.40	8.20	13.00
1968	82.60	9.80	3.00	4.32	203.00	14.40	8.20	13.00
1969	83.40	8.30	3.00	5.08	203.00	14.40	8.20	13.00
1970	76.00	8.80	3.00	4.35	188.00	14.40	8.20	13.00
1971	73.50	7.50	0.50	4.30	188.00	14.40	3.00	13.00
1972	55.00	5.90	0.20	4.55	188.00	14.40	3.00	13.00
1973	53.00	5.60	0.20	4.70	188.00	14.40	3.00	13.00
1974	51.00	5.30	0.20	4.50	174.00	13.80	3.00	12.90
1975	14.40	2.20	0.20	4.30	173.00	13.70	3.00	12.80
1976	13.50	2.00	0.20	3.60	172.00	13.60	3.00	12.80
1977	12.60	1.80	0.20	2.20	171.00	13.50	3.00	12.70
1978	3.70	1.60	0.20	2.15	120.00	6.20	3.00	12.00
1979	3.40	1.40	0.20	2.10	119.00	6.10	3.00	11.80
1980	3.10	1.20	0.20	2.05	118.00	6.00	3.00	11.60
1981	2.80	1.00	0.20	2.00	117.00	6.00	3.00	11.40

TABLE B-1 (Cont)

1991 - All Cases

	LDV				HDG			
	CO	HC-EX	HC-EV	NO_x	CO	HC-EX	HC-EV	NO_x
1975	18.00	3.00	0.20	4.10	176.00	14.00	3.00	13.00
1976	18.00	3.00	0.20	4.10	176.00	14.00	3.00	13.00
1977	18.00	3.00	0.20	2.60	176.00	14.00	3.00	13.00
1978	5.80	3.00	0.20	2.60	126.00	6.30	3.00	13.00
1979	5.80	3.00	0.20	2.60	126.00	6.30	3.00	13.00
1980	5.80	3.00	0.20	2.60	126.00	6.20	3.00	13.00
1981	5.80	3.00	0.20	2.60	126.00	6.20	3.00	13.00
1982	5.50	2.80	0.20	2.50	126.00	6.20	3.00	13.00
1983	5.20	2.60	0.20	2.40	125.00	6.20	3.00	13.00
1984	4.90	2.40	0.20	2.35	124.00	6.20	3.00	12.80
1985	4.60	2.20	0.20	2.30	123.00	6.20	3.00	12.60
1986	4.30	2.00	0.20	2.25	122.00	6.20	3.00	12.40
1987	4.00	1.80	0.20	2.20	121.00	6.20	3.00	12.20
1988	3.70	1.60	0.20	2.15	120.00	6.10	3.00	12.00
1989	3.40	1.40	0.20	2.10	119.00	6.10	3.00	11.80
1990	3.10	1.20	0.20	2.05	118.00	6.10	3.00	11.60
1991	2.80	1.00	0.20	2.00	117.00	6.00	3.00	11.40

Heavy Duty Diesel Emissions Factors - All Cases

28.70	4.60	0.00	20.40

Table 3.1.4-3 of AP-42$^{(15)}$ respectively. The values of f_i, D_i and the resulting m_i's are listed in Table B-2.

Speed correction factors (s_{pv} in equation (B-1)), which account for the variation in pollutant emissions with vehicle speed, were based on Figures 1, 2, and 3 of "An Interim Report..." which are shown in Figure B-1. As indicated by the data points of Figure B-1, considerable uncertainty in the value of s_{pv} exists for the low speeds (less than 15 mi/hr) typical of a congested urban area such as South Station.

To more accurately determine realistic speed correction factors for speeds less than 25 mi/hr, the following procedure was applied. The curves of Figure B-1 were expressed in the form

$$s_{pv} = \text{speed correction factor} = \alpha(\text{speed})^{\beta} \qquad \text{(B-4)}$$

using a least squares regression to equation B-4 and the data points in Figure B-1 to determine an individual α and β for each pollutant. These values are normally used to calculate s_{pv} and applied in equation (B-1) for the determination of e_{npv} for light- and heavy-duty gasoline vehicles (see Table B-3). In this analysis, α and β were used to compute speed corrected vehicle emission rates for CO, HC-EX, and NO_x in units of grams per vehicle-minute (g/veh-min) for speeds greater than 15 mi/hr using equation (B-5) and arbitrarily selected uncorrected emission rates for CO, HC-EX, and NO_x in units of g/veh-mi:

$$\begin{array}{l}\text{Speed cor-}\\ \text{rected in}\\ \text{g/veh-min}\end{array} = \frac{\begin{array}{l}\text{Arbitrary rate un-}\\ \text{corrected for speed}\\ \text{in g/veh-mi}\end{array} \quad \alpha(\text{speed})^{\beta} \quad \text{speed in mi/hr}}{60} \qquad \text{(B-5)}$$

where α and β have values given in Table B-3 and are assumed valid for both light-duty and heavy-duty gas vehicles. Consistent with the method outlined on page 59 of "Interim Guidelines for the Review of the Impact of Indirect Sources on Ambient Air Quality"$^{(16)}$ the speed corrected results of equation (B-5) were used as the dependent variable in a simple linear regression performed for CO and HC-EX, to determine equations relating speed-corrected emissions in g/veh-mi to all vehicle speeds. These equations were then used to calculate speed rates corrected in g/veh-mi for speeds less than 25 mi/hr. The ratios of the resulting

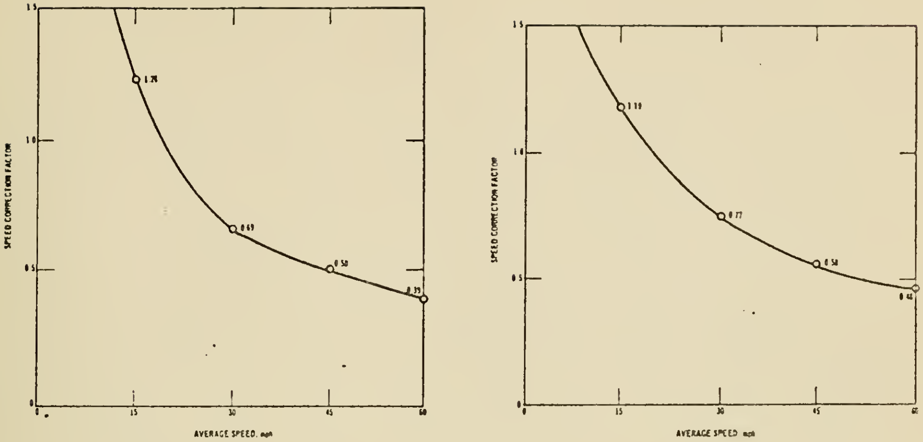
TABLE B-2

CALCULATION OF WEIGHTED ANNUAL TRAVEL

Age	LDV			HDG and HDD		
	f_i	D_i	m_i[1]	f_i	D_i	m_i
0[2]	.0000	15,900	.0000	.0000	17,200	.0000
1	.0743	15,900	.09972	.0918	17,200	.12754
2	.1181	15,000	.14953	.1227	17,200	.17048
3	.1223	14,000	.14453	.1082	15,800	.13809
4	.1226	13,100	.13557	.0906	15,800	.11563
5	.1023	12,200	.10535	.0814	13,000	.08548
6	.1068	11,300	.10187	.0804	13,000	.08443
7	.1032	10,300	.08972	.0740	11,000	.06575
8	.0824	9,400	.06538	.0650	11,000	.05776
9	.0648	8,500	.04649	.0531	9,000	.03860
10	.0457	7,600	.02932	.0453	9,000	.03293
11	.0237	6,700	.01340	.0342	5,500	.01519
12	.0142	6,700	.00803	.0300	5,500	.01333
13	.0056	6,700	.00317	.0206	5,500	.00915
14	.0024	6,700	.00136	.0144	5,500	.00640
15	.0027	6,700	.00153	.0154	5,500	.00684
16	.0021	6,700	.00119	.0163	5,500	.00724
17	.0068	6,700	.00385	.0516	5,500	.02515
	1.0000		1.0000	1.0000		1.0000

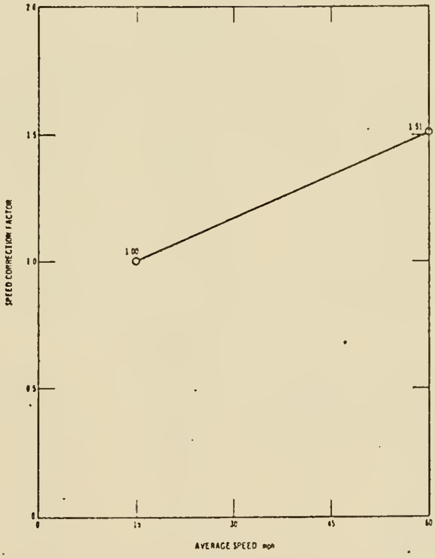
[1] $$m_i = \frac{f_i D_i}{\sum_i f_i D_i}$$

[2] refers to next year's models introduced in the fall.



CO

HC-EX



NO_X

Figure B-1 Average Speed Correction Curves for All Model Years

speed corrected rates in g/veh-mi to the arbitrary uncorrected rates used in equation (B-5) yield realistic CO and HC-EX speed correction factors for speeds less than or equal to 15 mi/hr. The speed correction factors obtained from the α's and β's in Table B-3 were assumed valid for speeds greater than 15 mi/hr. Using these derived speed correction factors for speeds less than or equal to 15 mi/hr and those determined from the α's and β's in Table B-3 for speeds greater than 15 mi/hr, new speed correction curves were determined for CO and HC-EX using another least squares regression to equation (B-4). These curves are characterized by the α's and β's presented in Table B-4. Since the simple linear regression of the results of equation (B-5) for NO_x resulted in a negative y-intercept, an NO_x speed correction factor of unity was assumed for speeds less than 25 mi/hr. Table B-4 presents the values of α and β for CO, HC-EX, and NO_x derived using this analysis. HC-EV is, by definition, independent of speed.

TABLE B-3

SPEED CORRECTION FACTORS

Pollutant	α	β
CO	12.6	-.846
HC-EX	6.31	-.615
HC-EV	1.0	0.0
NO_x	.325	.375

TABLE B-4

Pollutant	α	β
CO	18.4	-.985
HC-EX	11.6	-.821
HC-EV	1.0	0.0
NO_x	1.0	0.0

A comparison of the CO and HC-EX speed correction curves determined by the α's and β's is derived directly from the curves in Figure B-1 and presented in Table B-3, and those α's and β's derived by this analysis and presented in Table B-4 is shown in Figure B-2 and B-3 respectively.

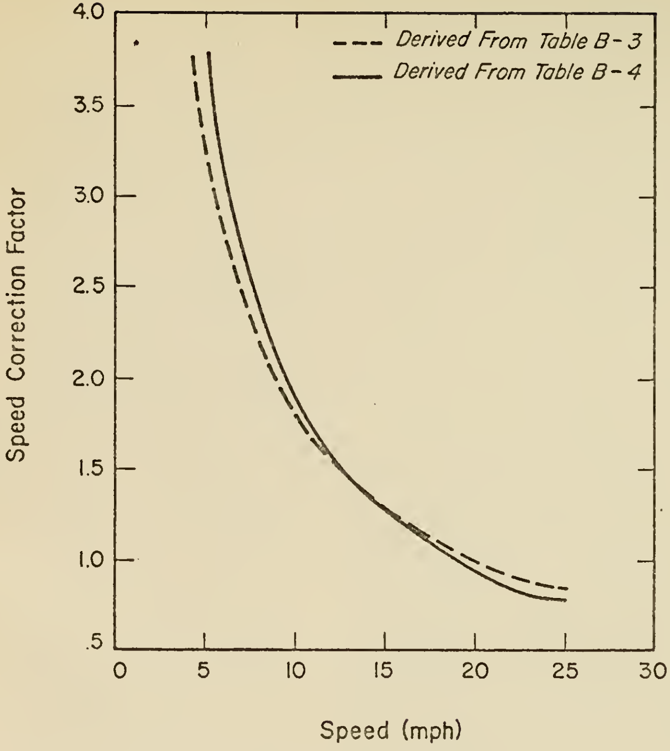


Figure B-2 Comparison of CO Speed Correction Curves Derived from Tables B-3 and B-4

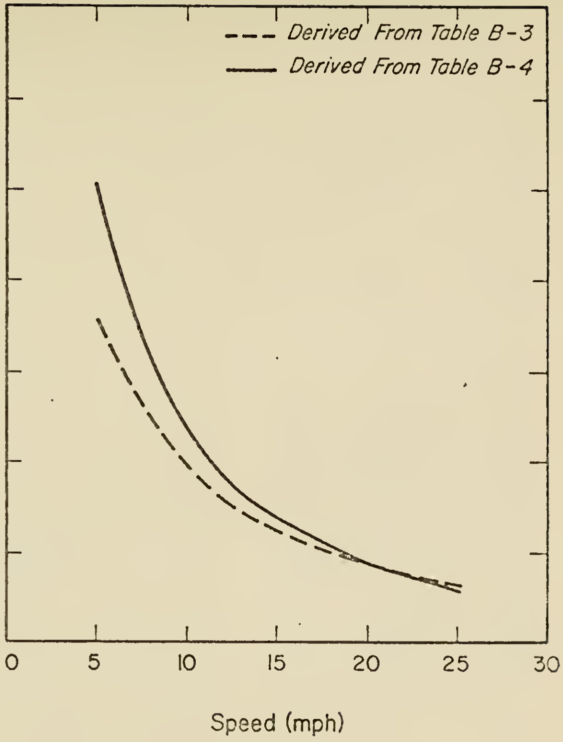


Figure B-3 Comparison of HC Speed Correction Curves Derived from Tables B-3 and B-4

These figures show that the α's and β's derived in this analysis actually result in larger speed correction factors than those derived from Figure B-1.

An incidental result of the extrapolation procedure used in this analysis is an appropriate idling emission factor for the mix of vehicles whose emissions are characterized by the "arbitrary" uncorrected emission rate in g/veh-mi (i.e., if the selection of the arbitrary rate was not totally arbitrary). Using the 1974 average CO emission factor for highway vehicles from Table 3.1.1-1 of AP-42, this procedure yields a 1974 idling emission rate of 17.0 g/veh-min which is conservative and consistent with the 1974 idling emission factor of 16.2 g/veh-min presented in "Interim Guidelines...".

The effects of the MBIAQCR's TCP, as discussed in Section 1.3, on expected vehicular emissions in 1981 and 1991 have been considered in the calculation of emission source strengths. Included in the TCP are both retrofit tailpipe controls, designed to further reduce pollutant emissions below the levels required by the FMVCP, and an inspection/maintenance (I/M) program to ensure that both factory-installed and retrofit tailpipe controls operate effectively. In particular, the MBIAQCR TCP in its present (February 28, 1975) form requires that a semi-annual loaded-mode I/M program with a 40% initial failure rate applicable to all gasoline-powered light-and medium-duty vehicles be implemented prior to the NAAQS attainment date of May 31, 1977. Additionally, the plan calls for the installation of (1) a VSAD device on all pre-1968 model year gasoline-powered light-duty vehicles, and (2) an air bleed device on all 1968-1971 model year gasoline-powered light-duty vehicles and all pre-1972 model year medium-duty vehicles, before the May 31, 1977 attainment date. The effects of these control measures on vehicular emissions were evaluated by considering the projected percent reduction in pollutant emissions to be effected by each measure.

Although the original (November 8, 1973) version of the TCP mandated a loaded-mode I/M program, the February 28, 1975 version expressed a willingness on the part of EPA to allow the Commonwealth to assess the feasibility and cost-effectiveness of an idle-mode I/M program. Consistent with the expected reductions used by EPA in their calculations of the effect of I/M on background CO levels in East Boston, projected CO, and HC-EX emission reductions of 13.5%(17) and 16.5% respectively -

an idle-mode program - have been assumed in this analysis. The implementation of the original loaded-mode I/M program would result in 16.5% and 21% reductions in CO and HC-EX emissions. Hence, the less conservative I/M program has been assumed. These reductions were applied to the CO and HC-EX emission factors calculated in equation (B-1) for light-duty vehicles and 85%(18) of the heavy-duty gasoline vehicles which were assumed to be medium-duty gasoline vehicles. The I/M program was assumed to have no effect on NO_x emissions.

Expected percent reductions of 9%, 25%, and 23%(19) on vehicular emissions of CO, HC-EX, and NO_x, respectively were assumed to result from the installation of VSAD devices on all pre-1968 gasoline-powered LDV's. As in the case of I/M, these reductions were applied to the light-duty CO, HC-EX, and NO_x emission factors calculated in equation (B-1). Emission factors of 1968-1971 model year light-duty vehicles and pre-1972 model year gasoline-powered medium-duty vehicles resulting from equation (B-1) for CO, HC-EX, and NO_x were reduced by 58%, 21%, and 5%, respectively to account for emission reductions due to the air bleed retrofit device. Though the TCP states that the device be installed on all medium-duty vehicles, the above reductions were applied to 85% of the gasoline-powered heavy-duty vehicles assumed to be gasoline-powered medium-duty vehicles. This represents a conservative estimation of emissions since pre-1972 diesel-powered medium-duty emissions were not reduced. Table B-5 summarizes the expected reductions applied in this analysis.

Estimated peak 1-hour and peak 8-hour traffic volumes, speeds and heavy-duty gasoline and diesel percentages were supplied by Metcalf and Eddy, Inc. for each roadway link and the following cases (see Tables B-6 through B-12):

(a) 1974 Existing - Plan A
(b) 1981 No Build - Plan B
(c) 1981 Build-2500 } Plan C
(d) 1981 Build-1000 }
(e) 1991 No Build - Plan B
(f) 1991 Build-2500 } Plan C
(g) 1991 Build-1000 }

TABLE B-5

EXPECTED REDUCTIONS (%) DUE TO MBIAQCR TCP

Pollutant	Vehicle Type	Proposed Control Measure					
		Inspection/Maintenance Program		VSAD Device		Air Bleed Device	
CO	LDV	All Model Year Vehicles	13.5	Pre-1968 Model Year Vehicles	9.0	1968-1971 Model Year Vehicles	58.0
	MDG[1]	All Model Year Vehicles	13.5		0.0	1968-1971 Model Year Vehicles	58.0
	MDD[2]		0.0		0.0	1968-1971 Model Year Vehicles	58.0
	HDV[3]		0.0		0.0		0.0
HC-EX	LDV	All Model Year Vehicles	16.5	Pre-1968 Model Year Vehicles	25.0	1968-1971 Model Year Vehicles	21.0
	MDG	All Model Year Vehicles	16.5		0.0	1968-1971 Model Year Vehicles	21.0
	MDD		0.0		0.0	1968-1971 Model Year Vehicles	21.0
	HDV		0.0		0.0		0.0
NO_x	LDV		0.0	Pre-1968 Model Year Vehicles	23.0	1968-1971 Model Year Vehicles	5.0
	MDG		0.0		0.0	1968-1971 Model Year Vehicles	5.0
	MDD		0.0		0.0	1968-1971 Model Year Vehicles	5.0
	HDV		0.0		0.0		0.0

[1] MDG = .85 HDG

[2] MDD = .85 HDD

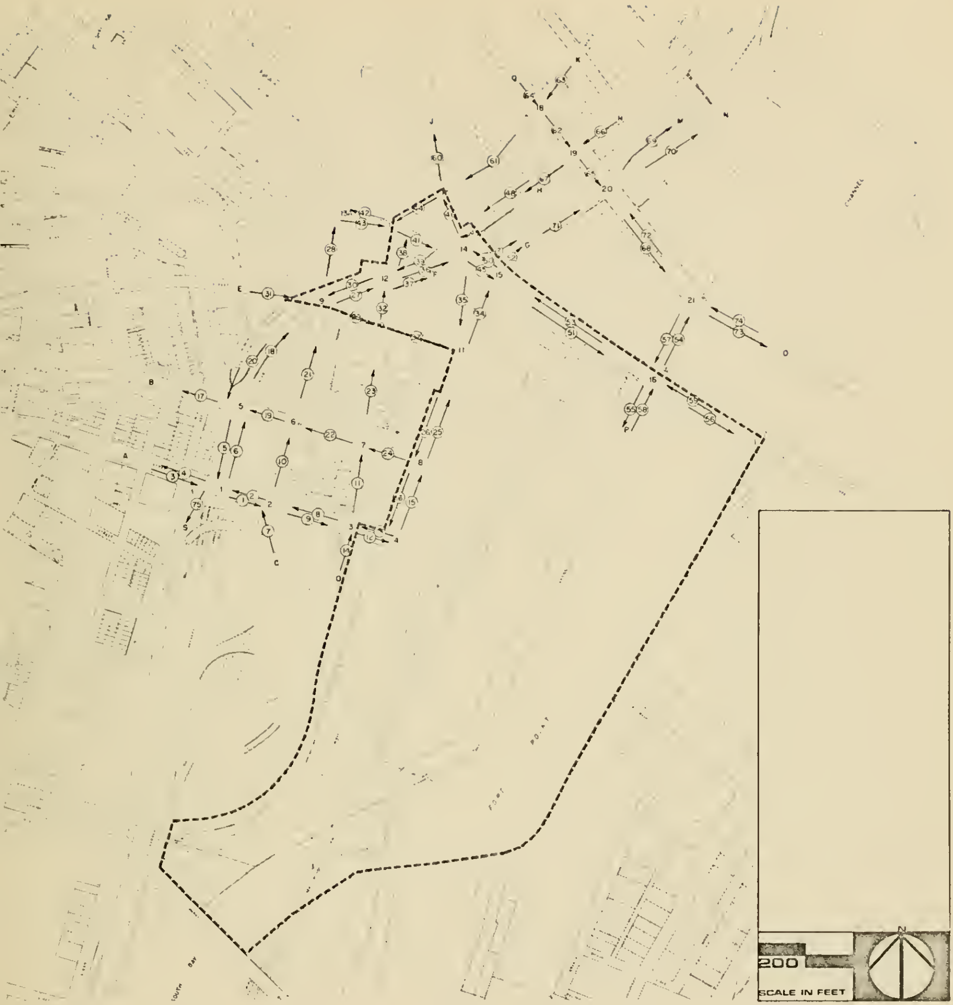
[3] HDV = HDG + HDD

Speed estimates were based upon consideration of typical relationships between volume to capacity ratio and average overall travel, traffic volumes, turning movements, network configuration, queue lengths, and traffic signal operating characteristics. The roadway link configuration for case (a) is shown in Figure B-4. Configurations for cases (b) and (e) are depicted in Figure B-5, and for cases (c), (d), (f), and (g) in Figure B-6.

Using the procedure outlined above for the calculation of e_{npv} for each analysis year, pollutant, and vehicle type, E_{np} (mg/m-sec) as defined in equation (B-2) was calculated for each roadway link and case. These emission source strengths are listed in Tables B-6 through B-12.

B.2 Calculation of Project Area Emission Burdens

Project area emission burdens of CO, NMHC, and NO_x for Alternatives 1, 2, and 3 in units of kilograms per peak 8-hour traffic period were determined from the CO, HC, and NO_x emission source strengths and roadway link lengths presented in Tables B-6 through B-12 by summing the product of the emission source strength (mg/m-sec) and the roadway link length (mi), converted to meters, over all roadway links and multiplying by 0.0288 (conversion from mg/sec to kg/peak 8-hour traffic period). For analysis purposes, all HC emissions have been considered to be NMHC. A tabulation of each emission burden calculation is presented in columns 11-16 of Tables B-6 through B-12. A discussion of the implications of this analysis is presented in Section 5.



FIGURE

Figure B-4 Roadway Network for the Existing (1974) Case, Plan A

BOSTON REDEVELOPMENT AUTHORITY

SOUTH STATION

ENVIRONMENTAL IMPACT REPORT

ENVIRONMENTAL RESEARCH & TECHNOLOGY INC

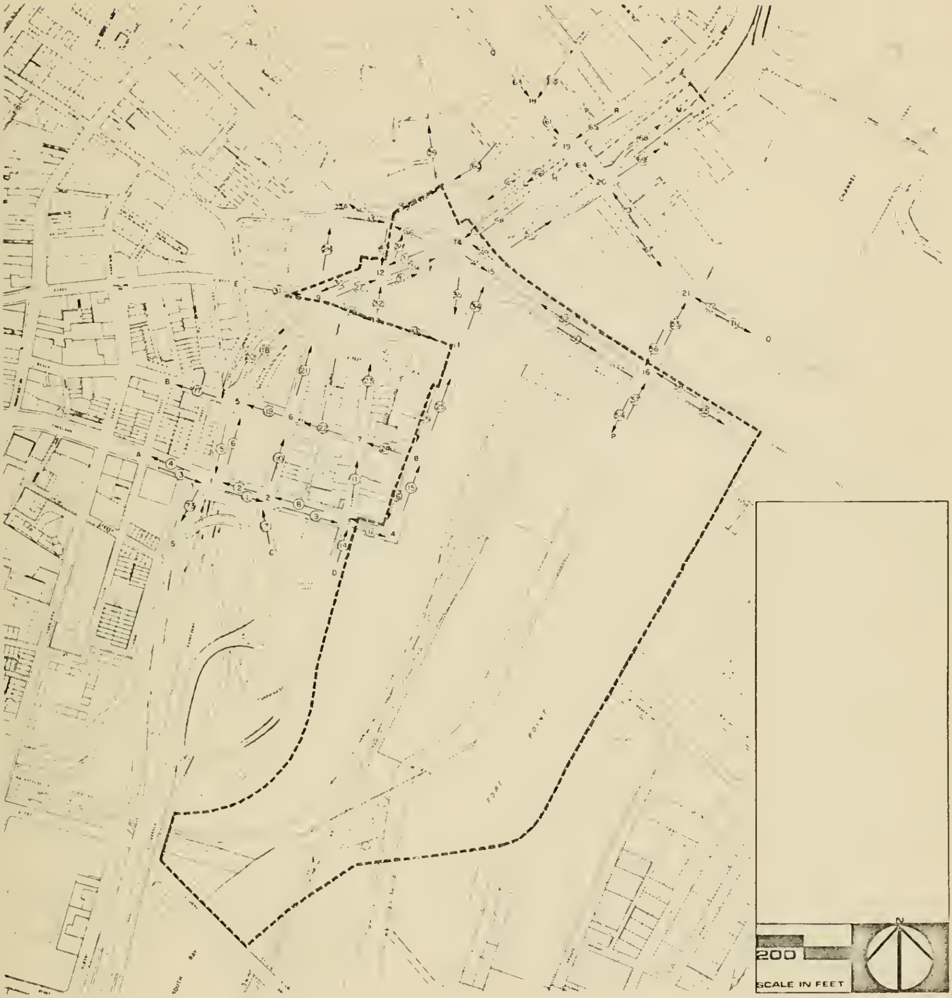


Figure B-5 Roadway Network for the No-Build Cases (1981 and 1991), Plan B

FIGURE

BOSTON REDEVELOPMENT AUTHORITY

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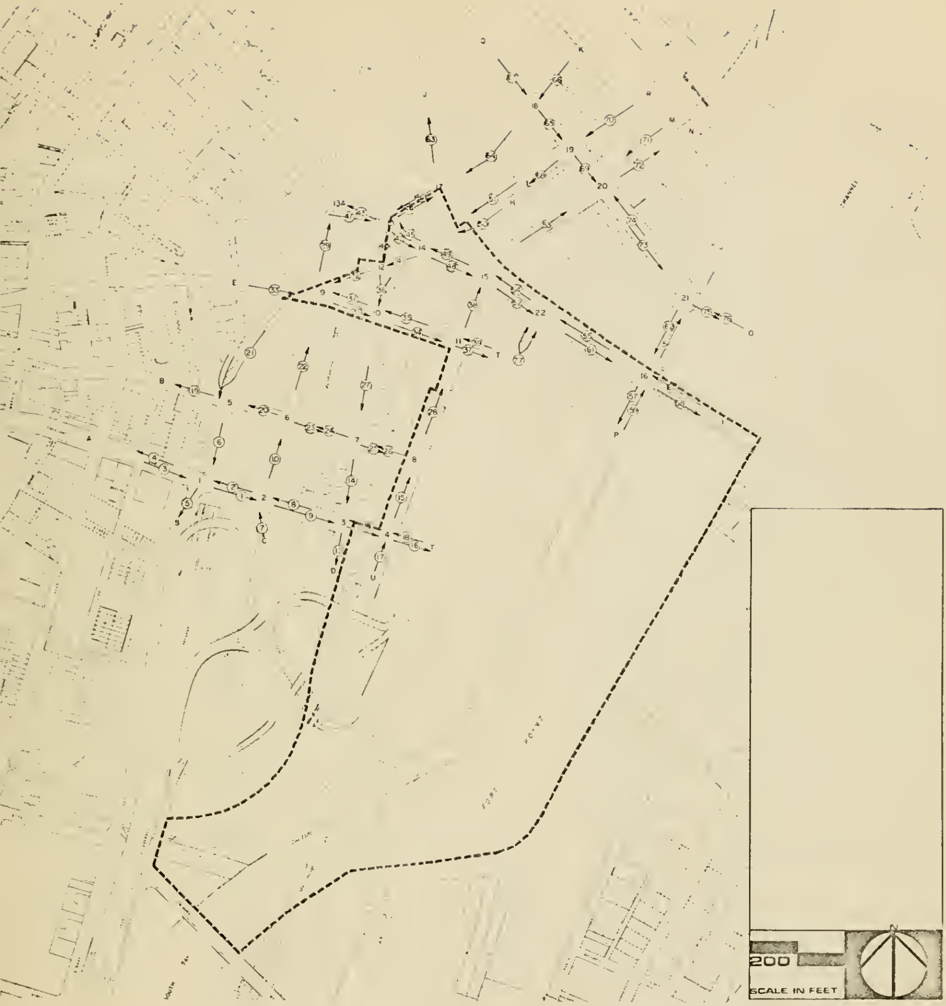

Figure B-6 Roadway Network for the Build Cases (1981 and 1991), Plan C

FIGURE

**BOSTON
REDEVELOPMENT
AUTHORITY**

SOUTH STATION

**ENVIRONMENTAL
IMPACT
REPORT**

ENVIRONMENTAL RESEARCH
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TABLE B-6

TRAFFIC DATA AND RESULTING EMISSION RATES - EXISTING (1974) - PLAN A

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NOx	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	5-Hour
1-2	1	240 P	7.5	1540	10.0	1,1	0.050	6.387	4.003	0.514	0.322	0.047	0.032	0.015	0.013
2-1	2	740 A	7.5	4840	10.0	1,1	0.050	19.604	12.579	1.585	1.012	0.144	0.099	0.046	0.041
A-1	3	1060 P	7.5	6300	10.0	2,2	0.059	28.099	16.316	2.688	1.549	0.244	0.152	0.080	0.064
1-A	4	710 P	5.0	5140	7.5	1,1	0.059	28.137	17.704	2.672	1.681	0.220	0.152	0.052	0.051
S-1	5	1320 P	12.5	7400	15.0	1,1	0.071	21.292	12.945	2.433	1.479	0.257	0.165	0.117	0.088
1-S	6	440 P	12.5	2500	15.0	1,1	0.071	7.097	4.373	0.811	0.500	0.085	0.056	0.039	0.030
C-2	7	1460 A	10.0	7900	12.5	1,3	0.038	29.304	16.563	1.792	1.013	0.177	0.106	0.069	0.050
3-2	8	660 P	10.0	2400	12.5	1,1	0.068	13.247	5.016	1.450	0.549	0.143	0.058	0.056	0.028
2-3	9	440A,P	10.0	3070	12.5	1,1	0.068	8.831	6.416	0.967	0.702	0.096	0.074	0.037	0.035
2-6	10	960 A	10.0	4270	12.5	1,1	0.072	19.269	8.924	2.233	1.034	0.221	0.108	0.065	0.052
3-7	11	1380 A	10.0	3400	12.5	1,1	0.069	27.698	7.105	3.076	0.789	0.304	0.083	0.119	0.040
3-4	12	780 A	15.0	3910	17.5	2,4	0.038	10.494	5.810	0.642	0.355	0.073	0.042	0.035	0.025
4-3	13	520 P	12.5	1820	15.0	1,1	0.038	8.386	3.184	0.513	0.195	0.055	0.022	0.025	0.012
0-3	14	1550 A	12.5	4760	15.0	1,5	0.036	25.002	8.413	1.449	0.488	0.153	0.054	0.070	0.029
4-8	15	780 A	20.0	3910	22.5	2,4	0.066	7.929	4.555	0.842	0.484	0.104	0.062	0.066	0.044
8-4	16	520 P	17.5	1820	20.0	1,1	0.066	6.021	2.385	0.639	0.253	0.073	0.027	0.045	0.020
5-B	17	480 A	5.0	2450	7.5	3,6	0.055	18.697	8.383	1.673	0.742	0.138	0.067	0.032	0.022
5-9	18	460 P	12.5	2910	15.0	1,1	0.113	7.420	5.091	1.349	0.926	0.143	0.103	0.065	0.055
6-5	19	140 P	7.5	780	10.0	3,6	0.051	3.700	2.013	0.304	0.165	0.027	0.016	0.009	0.007
9-5	20	1440 P	12.5	7600	15.0	1,1	0.113	23.227	13.400	4.224	2.437	0.447	0.271	0.205	0.146
6-9	21	840 A	10.0	3860	12.5	1,1	0.102	16.860	8.067	2.768	1.324	0.274	0.139	0.107	0.066
7-6	22	200 A	7.5	1130	10.0	3,6	0.102	5.286	2.917	0.868	0.479	0.079	0.047	0.025	0.019
7-10	23	1200 A	7.5	3200	10.0	1,1	0.102	31.936	8.317	5.243	1.365	0.478	0.134	0.153	0.055
8-7	24	140A,P	10.0	1000	12.5	3,6	0.050	2.790	2.075	0.225	0.167	0.022	0.018	0.009	0.008
8-11	25	780 A	20.0	3850	22.5	4,7	0.100	7.862	4.494	1.265	0.723	0.157	0.093	0.097	0.064
11-8	26	640 P	20.0	3100	22.5	1,1	0.100	6.521	3.656	1.050	0.589	0.130	0.076	0.080	0.052
9-12	27	940 P	12.5	6160	15.0	1,1	0.061	15.162	10.811	1.489	1.061	0.157	0.118	0.072	0.063
9-13a	28	920 A	7.5	4450	10.0	1,1	0.077	24.484	11.566	3.034	1.433	0.277	0.141	0.089	0.058
9-10	29	280A,P	10.0	1480	12.5	1,1	0.052	5.620	3.093	0.470	0.259	0.046	0.027	0.018	0.013
12-9	30	760 P	12.5	4200	15.0	1,1	0.061	12.259	7.347	1.204	0.721	0.128	0.080	0.055	0.043
E-9	31	720 P	5.0	4060	7.5	1,1	0.106	28.533	13.984	4.868	2.386	0.401	0.216	0.093	0.072
10-12	32	620 A	10.0	2630	12.5	1,1	0.037	12.444	5.496	0.471	0.327	0.073	0.034	0.029	0.016
10-11	33	680 A	10.0	2340	12.5	4,7	0.071	13.501	4.839	1.543	0.553	0.153	0.059	0.060	0.028
11-15	34	840A,P	10.0	4380	12.5	1,8	0.070	16.860	9.344	1.899	1.053	0.188	0.110	0.074	0.053
14-11	35	260 P	17.5	1280	20.0	3,7	0.085	2.994	1.675	0.410	0.229	0.049	0.028	0.027	0.018
12-14	36	520 A	10.0	2060	12.5	1,1	0.067	10.437	4.305	1.125	0.464	0.111	0.049	0.044	0.023
12-F	37	920 P	15.0	4770	17.5	1,1	0.031	12.416	7.181	0.619	0.358	0.070	0.042	0.035	0.025
12-13	38	580 A	7.5	1800	10.0	4,7	0.046	15.269	4.630	1.130	0.343	0.103	0.034	0.033	0.014
14-12	39	580 P	12.5	3180	15.0	1,1	0.067	9.355	5.563	1.007	0.600	0.107	0.067	0.049	0.036
13-12	40	360 P	7.5	1240	10.0	5,9	0.046	9.444	3.156	0.699	0.234	0.064	0.023	0.021	0.009
13-14	41	300 A	7.5	1510	10.0	6,10	0.059	8.015	4.020	0.761	0.382	0.070	0.037	0.022	0.015
13-13a	42	660 A	7.5	4400	10.0	4,7	0.044	17.375	11.316	1.230	0.801	0.112	0.079	0.036	0.032
13a-13	43	140A,P	7.5	760	10.0	3,9	0.044	3.700	1.934	0.262	0.137	0.024	0.014	0.007	0.006
17-13	44	740 P	7.5	4260	10.0	5,9	0.044	19.404	10.641	1.374	0.768	0.126	0.076	0.041	0.031
14-15	45	900 A	10.0	4330	12.5	6,3	0.036	18.129	9.078	1.050	0.526	0.104	0.055	0.040	0.026
14-17	46	480 A	7.5	2810	10.0	1,5	0.046	12.775	7.379	0.946	0.546	0.086	0.053	0.028	0.022
14-G	47	230 A	12.5	1010	15.0	1,18	0.043	3.710	1.822	0.257	0.126	0.027	0.014	0.012	0.008
19-14	48	470 P	7.5	1960	10.0	7,11	0.119	12.607	5.307	2.414	1.016	0.220	0.099	0.067	0.038
H-14	49	750 A	10.0	4370	12.5	7,11	0.045	15.162	9.505	1.098	0.688	0.109	0.072	0.041	0.032
15-14	50	580 P	7.5	3160	10.0	6,10	0.036	15.497	8.413	0.898	0.487	0.082	0.048	0.026	0.019
15-16	51	1170 A	15.0	5820	17.5	1,8	0.153	15.789	8.944	3.888	2.202	0.437	0.257	0.224	0.153
15-G	52	650 A	12.5	3390	15.0	1,8	0.020	10.485	6.053	0.337	0.195	0.035	0.022	0.016	0.012
16-15	53	970 P	12.5	4980	15.0	1,5	0.153	15.646	8.802	3.853	2.168	0.408	0.241	0.186	0.129
16-21	54	410A,P	20.0	2760	22.5	8,13	0.073	4.223	3.390	0.496	0.398	0.061	0.051	0.038	0.035
16-P	55	640 P	17.5	2530	20.0	0,14	0.082	7.549	3.534	0.996	0.466	0.117	0.057	0.064	0.033
16-I	56	590 A	15.0	3060	17.5	1,18	0.064	7.962	4.750	0.820	0.469	0.092	0.057	0.047	0.034
21-16	57	560 P	20.0	2920	22.5	7,19	0.073	5.733	3.536	1.674	0.516	0.083	0.053	0.049	0.035

TABLE B-6 (continued)

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO$_X$	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
P-16	58	500 A	17.5	2360	20.0	9,14	0.082	5.898	3.296	0.778	0.435	0.092	0.053	0.050	0.033
I-16	59	970 P	15.0	5700	17.5	6,15	0.064	13.129	8.926	1.352	0.909	0.152	0.106	0.076	0.064
17-J	60	550 A	5.0	2710	7.5	1,5	0.106	21.796	9.432	3.718	1.609	0.306	0.145	0.073	0.049
18-17	61	730 P	7.5	4560	10.0	10,16	0.106	19.275	11.933	3.288	2.036	0.301	0.199	0.100	0.084
18-19	62	1050 P	5.0	5290	7.5	1,1	0.047	41.611	18.220	3.148	1.375	0.259	0.125	0.062	0.042
K-18	63	1240 P	7.5	6460	10.0	10,17	0.042	32.741	17.081	2.213	1.155	0.202	0.113	0.068	0.047
Q-18	64	650 A	5.0	3900	7.5	2,9	0.066	25.650	13.153	2.725	1.397	0.224	0.127	0.055	0.043
19-20	65	1370 A	7.5	7520	10.0	2,18	0.042	36.317	20.155	2.455	1.362	0.224	0.133	0.073	0.035
R-19	66	1400 F	7.5	6640	10.0	1,18	0.069	37.259	17.797	4.138	1.976	0.378	0.192	0.121	0.079
19-L	67	1100 P	12.5	3300	15.0	1,18	0.048	17.743	5.953	1.371	0.460	0.145	0.051	0.066	0.027
20-21	68	820 A	20.0	4390	22.5	8,13	0.114	8.445	5.392	1.549	0.989	0.191	0.126	0.118	0.037
20-M	69	980 P	12.5	5800	15.0	8,12	0.063	15.978	10.492	1.620	1.064	0.171	0.117	0.078	0.062
20-N	70	1000 A	12.5	4850	15.0	8,12	0.094	16.315	8.773	2.467	1.371	0.266	0.146	0.119	0.077
G-20	71	880 A	10.0	4400	12.5	2,12	0.091	17.598	9.512	2.577	1.393	0.255	0.145	0.102	0.068
21-20	72	635 F	15.0	4120	17.5	10,8	0.114	8.518	6.331	1.563	1.162	0.176	0.135	0.094	0.050
21-0	73	860 F	20.0	4120	22.5	11,9	0.056	8.533	4.759	0.769	0.429	0.096	0.055	0.061	0.038
0-21	74	530 P	20.0	3100	22.5	11,9	0.056	5.220	3.580	0.470	0.323	0.053	0.042	0.038	0.029
1-5	75	1190 P	12.5	6540	15.0	1,9	0.037	19.195	11.203	1.143	0.667	0.121	0.075	0.055	0.040

[1] See Figure B-4.

[2] A denotes AM peak hour, P denotes PM peak hour, A,P denotes equal AM and PM peak.

[3] See Table B-13.

TABLE B-7

TRAFFIC DATA AND RESULTING EMISSION RATES - 1981 NO BUILD - PLAN B

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO_x	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	5-Hour
1-2	1	270 A	7.5	1790	10.0	1,1	0.50	1.741	1.256	0.140	0.101	0.018	0.013	0.013	0.012
2-1	2	840 P	7.5	5320	10.0	1,1	0.050	5.417	3.734	0.436	0.301	0.056	0.039	0.040	0.036
A-1	3	860 P	7.5	6880	10.0	2,2	0.059	5.545	4.830	0.527	0.459	0.068	0.059	0.050	0.055
1-A	4	760 P	5	5500	7.5	1,1	0.059	7.267	5.087	0.690	0.453	0.082	0.058	0.043	0.043
5-1	5	1000 P	10	7920	12.5	1,1	0.071	4.885	4.495	0.558	0.514	0.077	0.070	0.068	0.075
1-5	6	470 P	12.5	2680	15	3,3	0.071	1.851	1.277	0.212	0.146	0.031	0.021	0.032	0.025
C-2	7	1560 A	10	8450	12.5	1,4	0.038	7.620	4.785	0.466	0.293	0.064	0.040	0.057	0.042
3-2	8	790 P	7.5	2800	10	1,1	0.068	5.095	1.965	0.558	0.215	0.072	0.028	0.051	0.025
2-3	9	540 A	7.5	3440	10	1,1	0.068	3.453	2.414	0.381	0.264	0.049	0.034	0.035	0.031
2-6	10	1030 A	17.5	5320	20	3,3	0.072	2.942	1.934	0.341	0.224	0.054	0.035	0.070	0.050
3-7	11	1450 A	15	3600	17.5	3,3	0.069	4.797	1.483	0.533	0.165	0.081	0.024	0.095	0.033
3-4	12	900 A	12.5	4320	15	4,5	0.038	3.556	2.004	0.217	0.123	0.032	0.018	0.034	0.022
4-3	13	630 P	10	2090	12.5	1,1	0.038	3.078	1.186	0.188	0.073	0.026	0.010	0.023	0.011
0-3	14	1600 A	10	5000	12.5	1,6	0.036	7.816	2.928	0.453	0.170	0.062	0.023	0.055	0.024
4-8	15	900 A	20	4320	22.5	4,7	0.066	2.283	1.380	0.242	0.147	0.039	0.024	0.058	0.039
8-4	16	750 P	15	3440	17.5	1,1	0.066	2.472	1.410	0.262	0.150	0.039	0.022	0.047	0.030
5-8	17	520 A	5	2670	7.5	5,8	0.055	4.799	2.391	0.425	0.212	0.051	0.026	0.026	0.019
5-9	18	490 P	12.5	3110	15	1,1	0.113	1.932	1.486	0.351	0.270	0.051	0.039	0.053	0.047
6-5	19	150 P	7.5	830	10	6,9	0.051	0.932	0.563	0.076	0.046	0.010	0.006	0.007	0.006
9-5	20	1540 P	12.5	8190	15	1,10	0.113	6.072	3.908	1.104	0.711	0.160	0.101	0.166	0.122
6-9	21	900 A	15	4130	17.5	3,3	0.102	2.977	1.702	0.489	0.279	0.074	0.041	0.087	0.055
7-6	22	210 A	10	1210	12.5	6,9	0.102	0.987	0.664	0.162	0.109	0.023	0.015	0.020	0.016
7-10	23	1260 A	15	5420	17.5	1,1	0.102	4.174	1.414	0.685	0.232	0.104	0.035	0.123	0.047
8-7	24	150A,P	12.5	1070	15	1,9	0.050	0.568	0.494	0.046	0.040	0.007	0.006	0.007	0.007
8-11	25	830 A	20	4260	22.5	7,11	0.100	2.018	1.351	0.325	0.218	0.054	0.030	0.078	0.056
11-8	26	750 P	20	3400	22.5	1,1	0.100	1.891	1.113	0.304	0.179	0.050	0.029	0.072	0.045
9-12	27	1000 P	7.5	6610	10	3,3	0.061	6.451	4.636	0.633	0.455	0.081	0.059	0.058	0.053
9-13a	28	1000 A	7.5	4850	10	3,3	0.077	6.451	3.402	0.799	0.422	0.103	0.054	0.073	0.049
9-10	29	340 A	10	1660	12.5	1,1	0.052	1.661	0.942	0.139	0.079	0.020	0.011	0.017	0.012
12-9	30	810 P	10	4580	12.5	1,1	0.061	3.957	2.599	0.386	0.255	0.053	0.035	0.047	0.037
E-9	31	770 P	7.5	4340	10	3,3	0.106	4.967	3.044	0.847	0.519	0.109	0.067	0.077	0.060
10-12	32	660 A	7.5	2820	10	1,1	0.040	4.257	1.979	0.274	0.127	0.035	0.016	0.025	0.015
10-11	33	770 A	15	2580	17.5	7,11	0.071	2.458	1.033	0.281	0.118	0.044	0.018	0.052	0.024
11-15	34	970 P	12.5	4830	15	1,12	0.062	3.824	2.453	0.382	0.245	0.055	0.034	0.058	0.041
14-11	35	280 P	20	1430	22.5	6,11	0.083	0.677	0.454	0.090	0.061	0.015	0.010	0.021	0.016
12-14	36	640 A	5	3050	7.5	3,3	0.083	6.124	2.822	0.818	0.377	0.097	0.045	0.050	0.033
12-F	37	980 P	7.5	5100	10	3,3	0.031	6.322	3.577	0.315	0.179	0.041	0.023	0.029	0.021
12-13	38	620 P	5	1900	7.5	7,11	0.043	5.708	1.700	0.395	0.118	0.048	0.014	0.025	0.011
14-12	39	620 P	5	3460	7.5	1,1	0.083	5.928	3.200	0.792	0.428	0.094	0.052	0.049	0.038
13-12	40	550 P	7.5	2370	10	8,13	0.043	3.414	1.557	0.236	0.108	0.031	0.014	0.023	0.013
13-17	41	370 A	5	1700	7.5	3,14	0.044	3.540	1.624	0.251	0.115	0.029	0.014	0.015	0.010
13-13a	42	710 A	7.5	4710	10	10,17	0.042	4.410	3.092	0.298	0.209	0.040	0.028	0.028	0.025
13a-13	43	150A,P	5	810	7.5	5,15	0.042	1.384	0.701	0.094	0.047	0.012	0.006	0.006	0.004
17-13	44	790 P	5	4590	7.5	8,13	0.044	7.260	3.971	0.514	0.281	0.062	0.035	0.034	0.013
14-15	45	1060 A	5	5450	7.5	9,16	0.045	10.160	5.044	0.736	0.365	0.087	0.044	0.044	0.031
14-13	46	350 A	5	2310	7.5	10,17	0.048	3.224	1.999	0.249	0.154	0.030	0.019	0.016	0.014
19-14	47	370 P	7.5	1690	10	11,18	0.129	2.388	1.298	0.496	0.269	0.064	0.033	0.043	0.028
H-14	48	830 A	7.5	4760	10	11,18	0.057	5.358	3.655	0.492	0.335	0.063	0.041	0.043	0.035
15-14	49	620 P	5	3380	7.5	12,19	0.045	5.939	3.329	0.430	0.241	0.051	0.012	0.026	0.020
15-16	50	1250 A	10	6300	12.5	3,20	0.152	6.104	3.798	1.493	0.929	0.206	0.123	0.180	0.129
15-20	51	940 A	10	4840	12.5	13,21	0.118	4.594	3.000	0.872	0.570	0.121	0.074	0.108	0.076
16-15	52	1040 P	10	5330	12.5	1,6	0.152	5.080	3.121	1.243	0.764	0.171	0.102	0.151	0.110
16-21	53	440A,P	20	2950	22.5	14,22	0.073	1.147	1.081	0.135	0.127	0.022	0.019	0.031	0.030
16-P	54	680 P	17.5	2710	20	16,24	0.082	1.995	1.130	0.263	0.149	0.041	0.022	0.051	0.030
16-I	55	630 A	17.5	3270	20	9,25	0.064	1.791	1.306	0.184	0.135	0.030	0.020	0.037	0.029
21-16	56	560 P	15	2920	17.5	15,23	0.073	1.840	1.265	0.216	0.151	0.033	0.022	0.037	0.027
P-16	57	500 A	15	2510	17.5	16,24	0.082	1.704	1.189	0.225	0.157	0.034	0.022	0.037	0.027

TABLE B-7 (continued)

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO$_x$	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
I-16	58	1040 A	15	6100	17.5	9,25	0.064	3.429	2.761	0.353	0.284	0.054	0.041	0.061	0.054
17-J	59	600 A	5	2950	7.5	3,3	0.106	5.741	2.729	0.979	0.466	0.117	0.036	0.060	0.041
18-17	60	780 P	7.5	4930	10	17,6	0.106	5.027	3.571	0.858	0.609	0.111	0.077	0.082	0.071
18-19	61	1020 P	7.5	5660	10	3,3	0.047	6.580	3.970	0.498	0.300	0.064	0.039	0.045	0.035
K-18	62	1320 P	7.5	6900	10	17,26	0.042	8.507	5.154	0.575	0.348	0.075	0.044	0.055	0.040
Q-16	63	700 A	7.5	4200	10	13,17	0.066	4.513	2.757	0.479	0.293	0.062	0.039	0.045	0.035
19-20	64	1520 A	5	8570	7.5	13,27	0.042	14.520	8.696	0.981	0.589	0.117	0.068	0.062	0.049
R-19	65	1500 P	7.5	7160	10	3,27	0.069	9.676	5.505	1.075	0.611	0.139	0.075	0.098	0.067
19-L	66	1180 P	10	3530	12.5	3,27	0.048	5.762	2.192	0.445	0.169	0.061	0.022	0.054	0.023
20-21	67	880 A	20	4700	22.5	14,22	0.114	2.294	1.721	0.421	0.316	0.067	0.048	0.096	0.074
20-M	68	1050 A	10	6210	12.5	14,21	0.063	5.316	3.849	0.539	0.390	0.073	0.051	0.063	0.052
20-N	69	1090 A	10	5280	12.5	14,21	0.094	5.519	3.273	0.835	0.495	0.113	0.065	0.098	0.065
21-20	70	680 P	12.5	4400	15	17,20	0.114	2.690	2.230	0.494	0.409	0.072	0.057	0.077	0.067
21-0	71	940 P	20	4490	22.5	18,17	0.056	2.221	1.372	0.200	0.124	0.034	0.020	0.051	0.032
0-21	72	600 P	20	3300	22.5	18,17	0.056	1.418	1.008	0.128	0.091	0.022	0.015	0.033	0.024
1-S	73	1270 P	12.5	7000	15	1,1	0.037	5.007	3.344	0.298	0.199	0.043	0.028	0.045	0.035

[1] See Figure B-5.

[2] A denotes AM peak hour, P denotes PM peak hour, A,P denotes equal AM and PM peaks.

[3] See Table B-14.

TABLE B-8

TRAFFIC DATA AND RESULTING EMISSION RATES - 1981 BUILD-2500 - PLAN C

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO (mg/m-sec)		CO (g/sec)		HC (g/sec)		NO_x (g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
1-2	1	980 P	5	5800	7.5	1,2	0.051	9.364	5.363	0.769	0.440	0.091	0.053	0.048	0.039
2-1	2	980 P	5	5580	7.5	2,1	0.051	9.371	5.160	0.769	0.423	0.091	0.051	0.048	0.038
A-1	3	1210 P	5	5040	7.5	3,3	0.059	11.546	7.433	1.096	0.705	0.130	0.085	0.070	0.064
1-A	4	1010 P	5	6700	7.5	1,1	0.059	9.651	6.196	0.916	0.588	0.108	0.070	0.058	0.052
1-5	5	1350 P	12.5	7330	1.5	1,1	0.037	5.327	3.501	0.317	0.208	0.046	0.029	0.048	0.036
5-1	6	1070 P	10	6350	12.5	1,2	0.070	5.229	3.606	0.589	0.406	0.082	0.055	0.072	0.059
C-2	7	1650 A	10	8900	12.5	1,4	0.038	8.063	5.043	0.493	0.308	0.068	0.042	0.061	0.044
3-2	8	940 P	5	3740	7.5	2,1	0.067	8.965	3.455	0.969	0.373	0.115	0.044	0.060	0.033
2-3	9	1600 P	5	9260	7.5	1,2	0.067	15.289	8.562	1.649	0.923	0.195	0.111	0.104	0.083
2-6	10	940 A	15	5200	17.5	4,5	0.073	3.227	2.213	0.379	0.260	0.056	0.038	0.066	0.050
3-4	11	2020 A	5	7430	7.5	1,6	0.038	19.290	6.692	1.179	0.409	0.140	0.050	0.074	0.037
3-0	12	470 A	15	2270	17.5	1,7	0.065	1.559	0.967	0.163	0.101	0.025	0.014	0.030	0.019
4-3	13	550 P	5	2050	7.5	2,1	0.038	5.259	1.595	0.322	0.116	0.038	0.014	0.020	0.010
7-3	14	720 P	10	4090	12.5	1,7	0.069	3.515	2.394	0.391	0.266	0.053	0.035	0.045	0.038
4-8	15	1750 P	17.5	10960	20	5,8	0.066	5.224	4.148	0.555	0.440	0.087	0.067	0.117	0.100
4-T	16	30 P	10	160	12.5	6,9	0.024	0.149	0.099	0.006	0.004	0.001	0.001	0.004	0.003
U-4	17	1620 A	10	6060	12.5	7,5	0.100	7.858	3.546	1.264	0.570	0.173	0.076	0.152	0.081
T-4	18	30 P	10	160	12.5	6,9	0.024	0.149	0.099	0.006	0.004	0.001	0.001	0.004	0.003
5-8	19	530 A	5	2910	7.5	8,10	0.055	4.891	2.606	0.433	0.230	0.052	0.028	0.026	0.020
6-5	20	170 P	10	630	12.5	9,10	0.051	0.799	0.345	0.066	0.028	0.009	0.004	0.008	0.004
9-5	21	1200 P	15	6520	17.5	1,1	0.113	3.980	2.695	0.724	0.490	0.110	0.073	0.131	0.098
6-9	22	630 A	12.5	3540	15	7,4	0.102	2.452	1.657	0.407	0.277	0.060	0.050	0.061	0.047
6-7	23	50 P	10	160	12.5	3,3	0.060	0.244	0.091	0.024	0.009	0.003	0.001	0.003	0.001
7-6	24	190	10	780	12.5	9,11	0.060	0.893	0.425	0.086	0.041	0.012	0.006	0.010	0.005
7-8	25	50 P	12.5	160	15	5,12	0.050	0.205	0.077	0.016	0.006	0.002	0.001	0.003	0.001
8-7	26	140 P	12.5	400	15	10,7	0.050	0.573	0.197	0.046	0.016	0.007	0.002	0.007	0.003
10-7	27	880 P	17.5	4670	20	11,3	0.102	2.527	1.711	0.415	0.281	0.066	0.043	0.085	0.065
8-11	28	1520 P	20	10310	22.5	12,13	0.100	3.897	3.424	0.627	0.551	0.102	0.087	0.145	0.139
9-13a	29	1020 A	10	4920	12.5	7,4	0.077	4.981	2.788	0.617	0.346	0.085	0.047	0.074	0.050
9-10	30	490 P	10	4360	12.5	13,14	0.052	2.428	2.502	0.203	0.209	0.026	0.028	0.024	0.029
10-9	31	160 P	12.5	740	15	10,7	0.052	0.655	0.364	0.055	0.031	0.008	0.004	0.008	0.005
12-9	32	650 P	10	3240	12.5	2,1	0.059	3.175	1.839	0.302	0.175	0.041	0.024	0.037	0.026
E-9	33	800 P	7.5	4530	10	13,14	0.106	5.237	3.218	0.893	0.539	0.115	0.070	0.081	0.065
10-11	34	540 P	12.5	3670	15	12,15	0.071	2.162	1.775	0.247	0.203	0.035	0.029	0.037	0.033
11-10	35	170 P	10	850	12.5	10,7	0.071	0.861	0.495	0.098	0.057	0.013	0.008	0.012	0.008
12-10	36	630 P	10	3980	12.5	10,16	0.037	3.192	2.334	0.190	0.139	0.026	0.019	0.023	0.020
11-T	37	100 P	10	330	12.5	14,17	0.040	0.627	0.260	0.040	0.017	0.005	0.002	0.012	0.005
11-15	38	1910 P	10	13660	12.5	15,18	0.062	9.343	8.262	0.932	0.524	0.128	0.109	0.118	0.119
T-11	39	150 P	10	500	12.5	14,17	0.040	0.940	0.303	0.061	0.025	0.008	0.003	0.018	0.008
13-12	40	420 P	10	1460	12.5	11,3	0.046	2.053	0.829	0.152	0.061	0.021	0.008	0.019	0.009
14-12	41	1330 P	10	6940	12.5	11,3	0.038	6.501	3.944	0.398	0.241	0.054	0.033	0.049	0.036
13-14	42	160 P	7.5	1170	10	16,19	0.037	0.994	0.768	0.059	0.046	0.007	0.006	0.006	0.006
13-13a	43	740 A	7.5	5000	10	17,20	0.044	4.065	2.609	0.288	0.185	0.040	0.028	0.029	0.027
13-17	44	390 A	7.5	1970	10	7,5	0.044	2.516	1.426	0.178	0.101	0.024	0.013	0.016	0.012
14-13	45	1060 P	5	7690	7.5	2,1	0.037	10.136	7.112	0.604	0.424	0.071	0.051	0.037	0.038
17-13	46	810 P	7.5	4630	10	18,6	0.044	5.025	3.167	0.356	0.224	0.047	0.029	0.035	0.027
13a-13	47	170 AP	10	880	12.5	16,19	0.044	0.799	0.467	0.056	0.033	0.007	0.005	0.007	0.005
14-15	48	690 A	7.5	2790	10	16,19	0.056	4.286	1.831	0.386	0.165	0.051	0.022	0.036	0.020
15-14	49	1060 P	7.5	6290	10	2,21	0.056	6.836	4.697	0.616	0.423	0.079	0.053	0.057	0.048
H-14	50	1090 A	10	5490	12.5	1,1	0.045	5.326	3.116	0.386	0.226	0.053	0.031	0.047	0.033
19-14	51	460 P	10	2350	12.5	19,22	0.145	2.243	1.454	0.524	0.339	0.072	0.044	0.061	0.044
15-22	52	1040 A	10	7450	12.5	16,19	0.058	4.891	3.953	0.457	0.369	0.064	0.052	0.056	0.055
15-20	53	2020 P	10	10310	12.5	15,18	0.118	9.881	6.236	1.876	1.184	0.259	0.157	0.237	0.171
22-15	54	1470 P	7.5	6970	10	20,4	0.058	9.342	4.889	0.872	0.456	0.113	0.058	0.050	0.053
16-22	55	1100 P	12.5	5680	15	7,1	0.096	4.336	2.713	0.669	0.419	0.098	0.060	0.100	0.073
16-21	56	440 AP	12.5	2950	15	4,23	0.073	1.798	1.584	0.211	0.186	0.030	0.025	0.031	0.030
16-P	57	680 P	17.5	2710	20	21,24	0.082	1.995	1.129	0.263	0.149	0.041	0.022	0.051	0.030

TABLE B-8 (continued)

Identifier[1]		Traffic Data						Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]	Link Length	CO				HC		NO$_x$	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
16-1	58	650 A	17.5	3870	20	22,25	0.064	1.933	1.546	0.199	0.159	0.032	0.024	0.040	0.034
P-16	59	490 P	15	2520	17.5	21,24	0.082	1.669	1.194	0.220	0.157	0.033	0.033	0.037	0.027
I-16	60	1100 A	12.5	6580	15	22,25	0.064	4.324	3.443	0.445	0.355	0.064	0.049	0.065	0.060
22-16	61	1350 P	15	6810	17.5	7,26	0.096	4.565	2.983	0.705	0.461	0.107	0.067	0.125	0.088
21-16	62	560 P	12.5	2920	15	23,27	0.073	2.197	1.468	0.253	0.173	0.038	0.024	0.037	0.027
17-J	63	630 A	5	3220	7.5	7,5	0.106	6.028	3.075	1.028	0.525	0.122	0.062	0.063	0.046
18-17	64	800 P	7.5	4970	10	15,16	0.106	5.156	3.602	0.880	0.615	0.113	0.078	0.084	0.072
18-19	65	1070 P	7.5	6020	10	2,1	0.047	6.901	4.225	0.522	0.320	0.067	0.041	0.048	0.035
K-18	66	1360 P	7.5	7140	10	15,21	0.042	8.765	5.332	0.593	0.361	0.077	0.045	0.057	0.041
Q-18	67	775 A	7.5	4370	10	11,19	0.066	4.997	2.869	0.531	0.305	0.069	0.041	0.050	0.037
19-L	68	700 P	12.5	3370	15	11,25	0.048	2.764	1.763	0.214	0.136	0.031	0.019	0.033	0.023
19-20	69	1320 A	5.0	8010	7.5	11,28	0.042	12.605	8.128	0.852	0.549	0.101	0.063	0.054	0.046
R-19	70	1560 P	7.5	7410	10	1,25	0.069	10.059	5.701	1.117	0.633	0.145	0.078	0.104	0.071
20-M	71	1660 P	10	10890	12.5	15,18	0.063	8.120	6.586	0.523	0.668	0.153	0.088	0.104	0.096
20-N	72	1120 A	10	5650	12.5	15,18	0.094	5.478	3.417	0.829	0.517	0.114	0.068	0.105	0.075
20-21	73	880 A	12.5	4700	15	4,23	0.114	3.597	2.524	0.660	0.463	0.094	0.063	0.097	0.074
21-20	74	650 P	12.5	4400	15	15,26	0.114	2.690	2.230	0.494	0.409	0.072	0.057	0.077	0.067
21-0	75	940 P	17.5	4490	20	4,28	0.056	2.787	1.837	0.251	0.165	0.039	0.024	0.051	0.035
0-21	76	560 P	12.5	3300	15	24,19	0.056	2.053	1.473	0.185	0.133	0.028	0.020	0.030	0.024
T-22	77	750 P	10	2250	12.5	25,29	0.057	4.581	1.678	0.420	0.154	0.053	0.032	0.082	0.019

[1] See Figure B-6

[2] A denotes AM peak hour, P denotes PM peak hour, A,P denotes equal AM and PM peaks.

[3] See Table B-15.

TABLE B-9

TRAFFIC DATA AND RESULTING EMISSION RATES - 1981 BUILD-1000 - PLAN C

Identifier[1]		Traffic Data				Vehicle Mix Category[3]	Link Length	Vehicle Emissions							
		1-Hour		8-Hour				CO				HC		NO_x	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
1-2	1	910 A	5	5250	7.5	11,14	0.051	9.002	5.010	0.739	0.411	0.056	0.049	0.047	0.037
2-1	2	740 P	5	5120	7.5	11,14	0.051	7.320	4.886	0.600	0.401	0.069	0.048	0.038	0.036
A-1	3	1230 P	5	7490	7.5	13,14	0.059	11.689	7.148	1.110	0.679	0.132	0.081	0.076	0.061
1-A	4	1020 P	5	6200	7.5	10,6	0.059	10.107	5.734	0.962	0.545	0.112	0.066	0.059	0.043
1-5	5	1350 P	12.5	7330	15	4,6	0.037	5.329	3.503	0.317	0.209	0.046	0.030	0.048	0.036
5-1	6	1090 P	10	6280	12.5	4,6	0.070	5.327	3.565	0.600	0.402	0.083	0.055	0.074	0.059
C-2	7	1650 A	10	8900	12.5	4,5	0.035	8.064	5.043	0.493	0.309	0.068	0.042	0.061	0.044
3-2	8	700 P	7.5	3280	10.0	4,14	0.067	4.513	2.378	0.457	0.256	0.063	0.033	0.046	0.031
2-3	9	1530 P	5	8710	7.5	4,14	0.067	14.615	8.312	1.576	0.896	0.187	0.106	0.100	0.081
2-6	10	940 A	15	5200	17.5	9,12	0.073	3.223	2.210	0.379	0.260	0.056	0.033	0.066	0.050
3-4	11	2020 A	5	7340	7.5	4,17	0.038	19.296	6.569	1.152	0.402	0.140	0.049	0.075	0.037
3-D	12	380 P	15	1810	17.5	4,13	0.065	1.261	0.772	0.132	0.081	0.020	0.012	0.024	0.016
4-3	13	310 P	7.5	1590	10	14,18	0.038	2.218	1.189	0.136	0.073	0.016	0.009	0.013	0.009
7-3	14	720 P	10	4090	12.5	4,13	0.069	3.519	2.396	0.391	0.266	0.054	0.036	0.048	0.039
4-8	15	1700 P	17.5	10860	20	11,14	0.066	5.075	4.111	0.539	0.437	0.083	0.066	0.113	0.093
4-T	16	30 P	12.5	160	15	15,19	0.024	0.100	0.056	0.004	0.002	0.001	0.000	0.001	0.000
U-4	17	1610 A	10	5480	12.5	3,12	0.100	7.862	3.204	1.265	0.516	0.174	0.069	0.152	0.073
T-4	18	30 P	12.5	160	15	15,19	0.024	0.100	0.056	0.004	0.002	0.001	0.000	0.001	0.001
5-8	19	520 A	5	2770	7.5	4,13	0.055	4.967	2.644	0.440	0.234	0.053	0.029	0.025	0.021
6-5	20	120 P	10	530	12.5	4,13	0.051	0.586	0.311	0.048	0.026	0.007	0.003	0.006	0.004
9-5	21	1140 P	15	6420	17.5	4,6	0.113	3.784	2.656	0.689	0.483	0.104	0.072	0.125	0.097
6-9	22	630 A	12.5	3540	15	3,5	0.102	2.482	1.687	0.407	0.277	0.060	0.040	0.061	0.047
6-7	23	50 P	10	160	12.5	5,7	0.060	0.245	0.091	0.024	0.009	0.003	0.001	0.003	0.001
7-6	24	140 P	10	680	12.5	4,6	0.060	0.684	0,386	0.066	0.037	0.009	0.005	0.005	0.006
7-8	25	50 P	12.5	160	15	11,7	0.050	0.025	0.077	0.016	0.006	0.002	0.001	0.003	0.001
8-7	26	90 P	12.5	300	15	16,20	0.050	0.396	0.162	0.032	0.013	0.004	0.002	0.005	0.002
10-7	27	880 P	17.5	4670	20	4,7	0.102	2.525	1.715	0.414	0.282	0.066	0.043	0.087	0.065
8-11	28	1520 P	20	10310	22.5	4,6	0.100	3.846	3.379	0.619	0.544	0.101	0.087	0.148	0.138
9-13a	29	1020 A	10	4920	12.5	3,5	0.077	4.981	2.788	0.617	0.346	0.085	0.047	0.074	0.050
9-10	30	480 P	10	4160	12.5	9,5	0.052	2.430	2.357	0.203	0.197	0.027	0.027	0.024	0.028
10-9	31	160 P	12.5	740	15	10,13	0.052	0.654	0.365	0.054	0.031	0.005	0.004	0.008	0.005
12-9	32	590 P	10	3120	12.5	4,6	0.059	2.884	1.771	0.274	0.168	0.038	0.023	0.034	0.025
E-9	33	790 P	7.5	4430	10	3,12	0.106	5.096	3.207	0.869	0.547	0.112	0.069	0.079	0.062
10-11	34	530 P	12.5	3570	15	10,13	0.071	2.169	1.760	0.248	0.201	0.035	0.025	0.037	0.034
11-10	35	170 P	10	850	12.5	8,13	0.071	0.860	0.498	0.099	0.057	0.013	0.008	0.011	0.008
12-10	36	630 P	10	3980	12.5	10,14	0.037	3.192	2.335	0.190	0.139	0.026	0.019	0.023	0.021
11-T	37	100 P	10	330	12.5	17,21	0.040	0.627	0.260	0.040	0.017	0.005	0.002	0.012	0.005
11-15	38	1980 P	10	13560	12.5	5,22	0.062	9.685	8.201	0.966	0.818	0.134	0.108	0.122	0.119
T-11	39	150 P	10	500	12.5	17,21	0.040	0.940	0.393	0.061	0.025	0.008	0.003	0.018	0.008
13-12	40	420 P	10	1460	12.5	4,7	0.046	2.053	0.830	0.152	0.062	0.021	0.008	0.019	0.009
14-12	41	1270 P	10	6820	12.5	5,7	0.038	6.212	3.879	0.390	0.237	0.052	0.032	0.048	0.036
13-14	42	160 P	7.5	1170	10	3,23	0.037	1.032	0.874	0.061	0.052	0.008	0.007	0.006	0.006
13-13a	43	740 A	7.5	4900	10	10,14	0.044	4.948	3.552	0.350	0.251	0.044	0.032	0.032	0.030
13-17	44	390 A	7.5	1850	10	10,23	0.044	2.608	1.382	0.155	0.098	0.024	0.012	0.017	0.011
14-13	45	1020 A	5	7470	7.5	10,14	0.037	10.107	7.129	0.602	0.425	0.070	0.050	0.037	0.038
17-13	46	810 P	7.5	4630	10	18,17	0.044	5.027	3.146	0.356	0.223	0.047	0.029	0.035	0.027
13a-13	47	170 A,P	10	880	12.5	19,24	0.044	0.800	0.467	0.057	0.033	0.008	0.005	0.007	0.005
14-15	48	410 A	7.5	2200	10	4,7	0.056	2.644	1.545	0.238	0.139	0.031	0.018	0.022	0.017
15-14	49	890 P	7.5	5950	10	10,25	0.056	5.951	4.578	0.536	0.413	0.068	0.051	0.049	0.046
H-14	50	1090 A	12.5	5490	15	4,6	0.045	4.303	2.624	0.312	0.190	0.045	0.027	0.048	0.033
19-14	51	410 P	10	2010	12.5	8,26	0.145	2.074	1.280	0.484	0.299	0.066	0.038	0.055	0.038
15-22	52	1470 A	10	6760	12.5	3,17	0.048	7.178	3.716	0.670	0.347	0.093	0.048	0.081	0.052
15-20	53	1920 A	10	9780	12.5	5,27	0.118	9.391	6.091	1.784	1.157	0.246	0.151	0.226	0.164
22-15	54	1390 P	7.5	6110	10	10,13	0.058	9.295	4.426	0.868	0.413	0.110	0.053	0.079	0.048
16-22	55	1060 P	12.5	5450	15	4,28	0.096	4.184	2.627	0.646	0.406	0.094	0.058	0.099	0.075
16-21	56	440 PA	12.5	2950	15	9,29	0.073	1.797	1.584	0.211	0.186	0.030	0.025	0.031	0.030
16-P	57	680 P	17.5	2710	20	7,30	0.082	1.995	1.129	0.263	0.149	0.041	0.022	0.051	0.030
16-I	58	670 A	17.5	3580	20	3,31	0.064	1.914	1.474	0.197	0.147	0.031	0.022	0.041	0.031

TABLE B-9 (continued)

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO_x	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
P-16	59	440 A	15	2520	17.5	7,30	0.082	1.499	1.194	0.198	0.158	0.029	0.022	0.033	0.027
I-16	60	1060 P	12.5	6290	15	2,30	0.064	4.167	3.455	0.429	0.356	0.062	0.047	0.062	0.054
22-16	61	1280 A	15	6580	17.5	3,31	0.096	4.234	2.967	0.654	0.459	0.100	0.066	0.116	0.086
21-16	62	560 P	12.5	2920	15	1,32	0.073	2.197	1.468	0.258	0.173	0.038	0.024	0.037	0.027
17-J	63	620 A	5	3100	7.5	10,17	0.106	6.143	2.774	1.048	0.473	0.122	0.058	0.065	0.044
18-17	64	800 P	7.5	4970	10	5,13	0.106	5.156	3.600	0.580	0.614	0.113	0.078	0.084	0.072
18-19	65	1040 P	7.5	5700	10	4,13	0.047	6.706	4.129	0.507	0.312	0.065	0.040	0.047	0.036
12-18	66	1350 P	7.5	7040	10	4,24	0.042	8.704	4.621	0.589	0.312	0.077	0.041	0.054	0.038
Q-18	67	720 A	7.5	4250	10	5,23	0.066	4.641	3.174	0.493	0.337	0.064	0.042	0.047	0.038
19-L	68	700 P	12.5	3370	15	4,25	0.048	2.763	1.763	0.213	0.136	0.031	0.019	0.033	0.023
19-20	69	1420 A	5	8010	7.5	4,31	0.042	13.564	8.128	0.917	0.549	0.109	0.063	0.058	0.046
R-19	70	1540 P	7.5	7270	10	4,25	0.069	9.930	5.594	1.103	0.621	0.142	0.077	0.103	0.070
20-M	71	1660 P	10	10890	12.5	5,27	0.063	8.120	6.783	0.523	0.688	0.113	0.090	0.104	0.098
20-N	72	1110 A	10	5480	12.5	5,27	0.094	5.429	3.413	0.521	0.516	0.113	0.067	0.104	0.073
20-21	73	880 A	12.5	4700	15	9,29	0.114	3.594	2.524	0.659	0.463	0.094	0.063	0.096	0.074
21-20	74	680 P	12.5	4400	15	5,33	0.114	2.690	2.230	0.494	0.409	0.072	0.057	0.077	0.067
21-0	75	940 P	17.5	4490	20	9,29	0.056	2.782	1.837	0.251	0.166	0.039	0.024	0.050	0.035
0-21	76	560 P	12.5	3300	15	20,24	0.056	2.053	1.473	0.185	0.133	0.028	0.020	0.030	0.024
T-22	77	100 P	10	330	12.5	21,34	0.057	0.611	0.246	0.056	0.023	0.008	0.003	0.011	0.005

[1] See Figure 8-6.

[2] A denotes AM peak hour, P denotes PM peak hour, A,P denotes equal AM and PM peaks.

[3] See Table B-16.

TABLE B-10

TRAFFIC DATA AND RESULTING EMISSION RATES - 1991 NO BUILD - PLAN B

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO_x	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
1-2	1	270A	7.5	1,969	5.0	1, 1	0.050	0.677	1.252	0.054	0.101	0.014	0.015	0.011	0.011
2-1	2	840P	7.5	6,118	5.0	1, 1	0.050	2.106	3.891	0.169	0.313	0.044	0.057	0.033	0.054
A-1	3	860P	7.5	6,880	10.0	2, 2	0.059	2.168	2.289	0.206	0.217	0.053	0.045	0.041	0.046
1-A	4	760P	5.0	5,500	7.5	1, 1	0.059	2.800	2.384	0.266	0.226	0.062	0.045	0.035	0.036
5-1	5	1,000P	10.0	7,920	12.5	1, 1	0.071	1.916	2.142	0.219	0.245	0.059	0.054	0.055	0.065
1-5	6	470P	12.5	2,082	15.0	3, 3	0.071	0.729	0.701	0.083	0.080	0.023	0.019	0.026	0.024
C-2	7	1,560A	10.0	9,718	10.0	1, 4	0.038	2.988	3.196	0.183	0.196	0.049	0.041	0.046	0.040
3-2	8	790P	7.5	3,220	5.0	1, 1	0.068	1.981	2.048	0.217	0.224	0.055	0.041	0.042	0.025
2-3	9	540A	7.5	3,956	10.0	1, 1	0.068	1.354	1.312	0.148	0.144	0.038	0.033	0.029	0.030
2-6	10	1,030A	17.5	6,118	20.0	3, 3	0.072	1.176	1.076	0.136	0.125	0.041	0.031	0.057	0.048
3-7	11	1,450A	15.0	4,140	17.5	3, 3	0.069	1.903	0.819	0.211	0.091	0.062	0.022	0.077	0.031
3-4	12	900A	12.5	4,968	15.0	4, 5	0.038	1.421	1.081	0.087	0.066	0.024	0.016	0.028	0.022
4-3	13	630P	10.0	2,404	10.0	1, 1	0.038	1.207	0.798	0.074	0.049	0.020	0.010	0.019	0.010
0-3	14	1,600A	10.0	5,750	10.0	1, 6	0.036	3.065	2.032	0.178	0.118	0.048	0.023	0.045	0.024
4-8	15	900A	20.0	4.968	22.5	4, 7	0.066	0.939	0.767	0.100	0.052	0.031	0.021	0.048	0.038
8-4	16	750P	15.0	3,956	17.5	1, 1	0.066	0.978	0.792	0.104	0.084	0.030	0.020	0.039	0.029
5-8	17	520A	5.0	3,071	7.5	5, 8	0.055	1.728	1.231	0.153	0.109	0.039	0.023	0.021	0.018
5-9	18	490P	12.5	3,421	15.0	1, 1	0.113	0.764	0.785	0.139	0.143	0.039	0.033	0.043	0.043
6-5	19	150P	7.5	955	10.0	6, 9	0.051	0.339	0.294	0.028	0.024	0.008	0.006	0.006	0.005
9-5	20	1,540P	12.5	9,419	15.0	1, 10	0.113	2.401	2.151	0.437	0.391	0.123	0.090	0.136	0.118
6-9	21	900A	15.0	4,543	15.0	3, 3	0.102	1.181	1.033	0.194	0.170	0.057	0.039	0.071	0.031
7-6	22	210A	10.0	1,452	12.5	6, 9	0.102	0.362	0.364	0.059	0.060	0.017	0.014	0.016	0.016
7-10	23	1,260A	15.0	3,933	17.5	1, 1	0.102	1.664	0.787	0.273	0.129	0.080	0.031	0.100	0.045
8-7	24	150A,P	12.5	1,284	15.0	6, 9	0.050	0.210	0.273	0.017	0.022	0.005	0.005	0.006	0.007
8-11	25	830A	20.0	4,260	22.5	7, 11	0.100	0.775	0.644	0.125	0.104	0.041	0.027	0.064	0.047
11-8	26	750P	20.0	3,910	22.5	1, 1	0.100	0.766	0.629	0.123	0.101	0.038	0.026	0.059	0.044
9-12	27	1000P	7.5	7,602	7.5	3, 3	0.061	2.501	3.282	0.245	0.322	0.062	0.064	0.047	0.051
9-13a	28	1000A	7.5	5,335	10	3, 3	0.077	2.501	1.760	0.310	0.218	0.079	0.046	0.059	0.045
9-10	29	340A	10	1,992	10	1, 1	0.052	0.651	0.661	0.055	0.055	0.014	0.012	0.014	0.012
12-9	30	810P	10	5,267	12.5	1, 1	0.061	0.552	0.424	0.152	0.140	0.041	0.031	0.039	0.036
E-9	31	770P	7.5	4,774	7.5	3, 3	0.106	1.925	2.061	0.328	0.352	0.084	0.069	0.063	0.036
10-12	32	660A	7.5	3,243	7.5	1, 1	0.040	1.655	1.406	0.107	0.091	0.027	0.018	0.021	0.015
10-11	33	770A	15	3,096	15	7, 11	0.071	0.928	0.665	0.106	0.076	0.034	0.018	0.042	0.024
11-15	34	970P	12.5	6,268	12.5	1, 12	0.062	1.513	1.913	0.151	0.191	0.043	0.038	0.047	0.045
14-11	35	280P	20	1,645	20	6, 11	0.083	0.255	0.275	0.034	0.037	0.012	0.009	0.017	0.013
12-14	36	640A	5	3,355	5	3, 3	0.083	2.355	2.129	0.315	0.384	0.074	0.052	0.041	0.031
12-F	37	980P	7.5	5,865	7.5	3, 3	0.031	2.451	2.532	0.122	0.126	0.031	0.025	0.023	0.020
12-13	38	620P	5	2,185	7.5	7, 11	0.043	2.072	0.884	0.143	0.061	0.037	0.013	0.020	0.010
14-12	39	620P	5	3,979	7.5	1, 1	0.082	2.285	1.725	0.305	0.230	0.072	0.045	0.040	0.037
13-12	40	550P	7.5	2,726	7.5	8, 13	0.043	1.262	1.025	0.087	0.071	0.024	0.016	0.019	0.013
13-17	41	370A	5	1,870	7.5	3, 14	0.044	1.361	0.861	0.096	0.061	0.023	0.011	0.013	0.009
13-13a	42	710A	7.5	4,710	10	10, 17	0.042	1.612	1.350	0.109	0.091	0.030	0.021	0.023	0.021
13a-13	43	150A,P	5	801	7.5	5, 15	0.042	0.499	0.332	0.034	0.022	0.008	0.005	0.005	0.004
17-13	44	790P	5	5,279	7.5	8, 13	0.044	2.651	1.985	0.188	0.141	0.047	0.031	0.028	0.025
14-15	45	1060A	5	5,995	7.5	9, 16	0.045	3.886	2.576	0.281	0.187	0.066	0.037	0.035	0.029
14-13	46	350A	5	2,657	7.5	10, 17	0.048	1.168	0.950	0.090	0.077	0.023	0.017	0.013	0.014
19-14	47	370P	7.5	1,859	7.5	11, 18	0.129	0.915	0.955	0.190	0.198	0.049	0.034	0.035	0.026
H-14	48	830A	7.5	5,236	7.5	11, 18	0.057	2.053	2.690	0.188	0.247	0.048	0.043	0.034	0.032
15-14	49	620P	5	3,718	5	12, 19	0.045	2.276	2.677	0.165	0.194	0.039	0.032	0.021	0.019
15-16	50	1250A	10	6,300	12.5	3, 20	0.152	2.385	1.910	0.583	0.467	0.158	0.094	0.146	0.108
15-20	51	940A	10	5,324	12.5	13, 21	0.118	1.811	1.693	0.344	0.322	0.093	0.063	0.088	0.070
16-15	52	1040P	10	6,130	12.5	1, 6	0.152	1.992	1.764	0.487	0.432	0.131	0.091	0.123	0.106
16-21	53	440A,P	20	2,950	22.5	14, 22	0.073	0.484	0.583	0.057	0.069	0.016	0.015	0.025	0.025
16-P	54	680P	17.5	2,710	20	16, 24	0.082	0.815	0.610	0.108	0.081	0.031	0.017	0.041	0.025
16-I	55	630A	17.5	3,761	17.5	9, 25	0.064	0.706	0.895	0.073	0.092	0.023	0.019	0.030	0.028
21-16	56	560P	15	2,920	17.5	15, 23	0.073	0.711	0.627	0.084	0.074	0.025	0.017	0.029	0.022
P-16	57	500A	15	2,510	17.5	16, 24	0.082	0.693	0.640	0.091	0.084	0.026	0.017	0.030	0.023

TABLE B-10 (continued)

Identifier[1]		Traffic Data						Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]	Link Length	CO				HC		NO$_x$	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
1-16	58	1040 A	15	7015	17.5	9,25	0.064	1.343	1.670	0.138	0.172	0.042	0.036	0.050	0.035
17-J	59	600 A	5	2950	7.5	3,3	0.106	2.208	1.274	0.377	0.217	0.058	0.043	0.049	0.034
18-17	60	780 P	7.5	5670	10	17,6	0.106	1.977	2.000	0.337	0.342	0.085	0.068	0.068	0.064
18-19	61	1020 P	7.5	6509	10	3,3	0.047	2.551	2.147	0.195	0.162	0.049	0.034	0.037	0.034
K-18	62	1320 P	7.5	7590	10	17,26	0.042	3.346	2.850	0.226	0.193	0.057	0.037	0.046	0.037
Q-18	63	700 A	7.5	4620	10	13,17	0.066	1.762	1.323	0.187	0.141	0.047	0.033	0.037	0.032
19-20	64	1520 A	5	9427	7.5	13,27	0.042	5.613	4.883	0.379	0.330	0.089	0.057	0.051	0.046
R-19	65	1500 P	7.5	8234	10	3,27	0.069	3.751	3.250	0.417	0.361	0.106	0.066	0.080	0.063
19-L	66	1180 P	10	4060	12.5	3,27	0.048	2.251	1.301	0.174	0.101	0.047	0.020	0.044	0.022
20-21	67	880 A	20	5405	17.5	14,22	0.114	0.968	1.339	0.178	0.246	0.052	0.050	0.079	0.072
20-M	68	1050 A	10	7142	12.5	14,21	0.063	2.185	2.271	0.222	0.230	0.056	0.045	0.052	0.05
20-N	69	1090 A	10	6072	12.5	14,21	0.094	2.268	1.930	0.343	0.292	0.087	0.057	0.050	0.064
21-20	70	680 P	12.5	5060	15	17,20	0.114	1.082	1.297	0.199	0.238	0.055	0.050	0.064	0.065
21-0	71	940 P	20	4490	22.5	18,17	0.056	0.829	0.625	0.075	0.056	0.026	0.016	0.042	0.027
0-21	72	600 P	20	3795	17.5	18,17	0.056	0.529	0.657	0.048	0.059	0.017	0.016	0.027	0.023
1-S	73	1270 P	12.5	8050	10	1,1	0.037	1.980	2.670	0.118	0.159	0.033	0.033	0.037	0.033

[1] See Figure 8-5.

[2] A denotes AM peak hour, P denotes PM peak hour, A,P denotes equal AM and PM peaks.

[3] See Table 8-14.

TABLE B-11

TRAFFIC DATA AND RESULTING EMISSION RATES - 1991 BUILD-2S00 - PLAN C

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO_x	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
1-2	1	980P	5.0	6,380	5.0	1, 2	0.051	3.616	4.037	0.297	0.333	0.069	0.040	0.040	0.037
2-1	2	980P	5.0	6,417	5.0	2, 1	0.051	3.611	4.081	0.296	0.335	0.069	0.041	0.039	0.037
A-1	3	1,210P	5.0	8,040	7.5	3, 3	0.059	4.478	3.499	0.425	0.332	0.100	0.065	0.058	0.055
1-A	4	1,010P	5.0	6,700	7.5	1, 1	0.059	3.727	2.904	0.354	0.276	0.053	0.054	0.047	0.044
1-S	5	1,350P	12.5	8,430	10.0	1, 1	0.037	2.116	2.796	0.126	0.167	0.035	0.035	0.039	0.035
S-1	6	1,070P	10.0	6,350	12.5	1, 2	0.070	2.058	1.724	0.232	0.194	0.062	0.043	0.059	0.051
C-2	7	1,650A	10.0	10,235	10.0	1, 4	0.038	3.173	3.376	0.194	0.207	0.052	0.043	0.050	0.043
3-2	8	940P	5.0	4,301	5.0	2, 1	0.067	3.464	2.735	0.374	0.295	0.087	0.033	0.049	0.032
2-3	9	1,600P	5.0	10,649	7.5	1, 2	0.067	5.904	4.625	0.637	0.499	0.149	0.035	0.085	0.051
2-6	10	940A	15.0	5,980	17.5	4, 5	0.073	1.351	1.265	0.159	0.149	0.044	0.034	0.054	0.047
3-4	11	2,020A	5.0	8,545	7.5	1, 6	0.038	7.454	3.515	0.456	0.215	0.107	0.044	0.061	0.035
3-D	12	470A	15.0	2,611	15.0	1, 7	0.065	0.625	0.637	0.065	0.067	0.019	0.015	0.024	0.013
4-3	13	550P	5.0	2,358	7.5	2, 1	0.038	2.027	1.022	0.124	0.063	0.029	0.012	0.016	0.011
7-3	14	720P	10.0	4,090	12.5	1, 7	0.069	1.355	1.177	0.154	0.131	0.041	0.027	0.039	0.032
4-8	15	1,750P	17.5	10,960	20.0	5, 8	0.066	2.247	2.107	0.239	0.224	0.066	0.052	0.097	0.055
4-T	16	30P	10.0	160	12.5	6, 9	0.024	0.149	0.099	0.006	0.004	0.001	0.001	0.004	0.005
U-4	17	1,620A	10.0	6,969	10.0	7, 5	0.100	3.091	2.456	0.495	0.395	0.134	0.079	0.125	0.073
T-4	18	30P	10.0	200	12.5	6, 9	0.024	0.149	0.124	0.006	0.005	0.001	0.001	0.004	0.004
5-8	19	530A	5.0	3,347	7.5	8, 10	0.055	1.761	1.342	0.156	0.119	0.040	0.025	0.021	0.019
6-5	20	170P	10.0	725	12.5	9, 10	0.051	0.293	0.180	0.024	0.015	0.007	0.004	0.006	0.004
9-5	21	1,200P	15.0	7,498	15.3	1, 1	0.113	1.595	1.690	0.290	0.307	0.054	0.071	0.107	0.095
6-9	22	630A	12.5	4,071	12.5	7, 4	0.102	0.977	1.095	0.165	0.179	0.045	0.040	0.049	0.046
6-7	23	50P	10.0	192	12.5	3, 3	0.060	0.097	0.052	0.009	0.005	0.002	0.001	0.002	0.001
7-6	24	190P	10.0	936	12.5	9, 11	0.060	0.327	0.235	0.032	0.023	0.010	0.005	0.008	0.006
7-8	25	50P	12.5	192	15.0	5, 12	0.050	0.087	0.045	0.007	0.004	0.002	0.001	0.002	0.001
8-7	26	140P	12.5	480	15.0	10, 7	0.050	0.239	0.117	0.019	0.009	0.006	0.002	0.006	0.003
10-7	27	880P	17.5	5,371	20.0	11, 3	0.102	1.027	0.968	0.169	0.159	0.050	0.039	0.072	0.063
8-11	28	1,520P	20.0	11,857	20.0	12, 13	0.100	1.620	2.176	0.261	0.350	0.079	0.054	0.121	0.133
9-13a	29	1,020A	10.0	4,920	12.5	7, 4	0.077	1.946	1.321	0.241	0.164	0.065	0.036	0.060	0.042
9-10	30	490P	10.0	5,232	12.5	13, 14	0.052	0.969	1.441	0.051	0.121	0.021	0.026	0.020	0.032
10-9	31	160P	12.5	888	15.0	10, 7	0.052	0.274	0.217	0.023	0.018	0.006	0.004	0.007	0.005
12-9	32	650P	10.0	5,726	12.5	2, 1	0.059	1.245	1.008	0.118	0.096	0.032	0.021	0.030	0.025
E-9	33	800P	7.5	4,983	10.0	13, 14	0.106	2.074	1.687	0.354	0.288	0.085	0.059	0.066	0.053
10-11	34	540P	12.5	4,404	15.0	12, 15	0.071	0.876	1.036	0.100	0.118	0.028	0.027	0.031	0.035
11-10	35	170P	10.0	1,020	12.5	10, 7	0.071	0.357	0.293	0.041	0.034	0.010	0.007	0.010	0.005
12-10	36	630P	10.0	4,776	12.5	10, 16	0.037	1.323	1.384	0.079	0.082	0.020	0.017	0.019	0.021
11-T	37	100P	10.0	330	12.5	14, 17	0.040	0.440	0.196	0.028	0.013	0.004	0.002	0.011	0.005
11-15	38	1,910P	10.0	15,026	12.5	15, 18	0.062	3.717	4.631	0.371	0.462	0.099	0.032	0.097	0.111
T-11	39	150P	10.0	625	12.5	14, 17	0.040	0.659	0.371	0.042	0.024	0.006	0.003	0.017	0.009
13-12	40	420P	10.0	1,752	12.5	11, 3	0.046	0.811	0.477	0.060	0.035	0.016	0.008	0.015	0.009
14-12	41	1,330P	10.0	8,328	12.5	11, 3	0.038	2.568	2.269	0.157	0.139	0.043	0.030	0.040	0.036
13-14	42	160P	7.5	1,287	10.0	16, 19	0.037	0.363	0.369	0.022	0.022	0.006	0.005	0.004	0.005
13-13a	43	740A	7.5	5,000	10.0	17, 20	0.044	1.175	0.793	0.083	0.056	0.032	0.022	0.024	0.022
13-17	44	390A	7.5	2,167	7.5	7, 5	0.044	0.975	1.000	0.069	0.071	0.017	0.013	0.013	0.011
14-13	45	1,060P	5.0	8,459	7.5	2, 1	0.037	3.906	3.667	0.233	0.218	0.055	0.043	0.031	0.035
17-13	46	810P	7.5	5,325	10.0	18, 6	0.044	1.862	1.679	0.132	0.119	0.036	0.026	0.028	0.026
3a-13	47	170AP	10.0	968	12.5	16, 19	0.044	0.295	0.226	0.021	0.016	0.006	0.004	0.006	0.005
14-15	48	690A	7.5	3,069	10.0	16, 19	0.056	1.567	0.879	0.141	0.079	0.039	0.019	0.029	0.018
15-14	49	1,060P	7.5	6,919	10.0	2, 21	0.056	2.658	2.595	0.240	0.234	0.061	0.047	0.046	0.045
H-14	50	1,090A	10.0	5,490	12.5	1, 1	0.045	2.096	1.485	0.152	0.108	0.040	0.024	0.039	0.023
19-14	51	460P	10.0	2,585	12.5	19, 22	0.145	0.864	0.815	0.202	0.190	0.055	0.037	0.048	0.041
15-22	52	1,040A	10.0	7,450	12.5	16, 19	0.058	1.804	1.741	0.168	0.163	0.049	0.040	0.046	0.036
15-20	53	2,020P	10.0	11,341	12.5	15, 18	0.118	3.931	3.495	0.747	0.664	0.200	0.113	0.196	0.160
22-15	54	1,470P	7.5	7,667	10.0	20, 4	0.058	3.541	2.529	0.331	0.236	0.087	0.049	0.065	0.049
16-22	55	1,100P	12.5	5,680	15.0	2, 1	0.096	1.715	1.303	0.265	0.201	0.074	0.046	0.052	0.061
16-21	56	440AP	12.5	2,950	15.0	4, 23	0.073	0.747	0.842	0.085	0.099	0.023	0.019	0.026	0.025
16-P	57	680P	17.5	2,710	20.0	21, 24	0.082	0.815	0.610	0.108	0.081	0.031	0.017	0.041	0.025
16-1	58	680A	17.5	4,451	17.5	22, 25	0.064	0.762	1.059	0.078	0.109	0.024	0.023	0.032	0.071

TABLE B-11 (continued)

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO$_x$	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
P-16	59	490A	15.0	2,520	17.5	21, 24	0.082	0.679	0.642	0.090	0.085	0.025	0.016	0.029	0.023
I-16	60	1,100A	12.5	7,567	17.5	22, 25	0.064	1.684	1.801	0.173	0.186	0.050	0.039	0.052	[illegible]
22-16	61	1,380P	15.0	6,810	17.5	7, 26	0.096	1.811	1.518	0.240	0.235	0.082	0.051	0.102	0.074
21-16	62	560P	12.5	2,920	15.0	23, 27	0.073	0.846	0.726	0.099	0.055	0.029	0.018	0.029	0.022
17-J	63	630A	5.0	3,720	7.5	7, 5	0.106	2.318	1.486	0.395	0.253	0.093	0.047	0.051	0.033
18-17	64	800P	7.5	5,716	10.0	15, 16	0.106	2.028	2.031	0.346	0.346	0.085	0.069	0.069	0.071
18-19	65	1,070P	715	6,923	10.0	2, 1	0.047	2.683	2.297	0.203	0.174	0.052	0.036	0.039	[illegible]
K-18	66	1,360P	7.5	7,854	10.0	15, 21	0.042	3.448	2.945	0.233	0.199	0.059	0.038	0.047	0.033
Q-18	67	775A	7.5	4,807	10.0	11, 19	0.066	1.954	1.377	0.208	0.146	0.053	0.034	0.041	0.034
19-L	68	700P	12.5	3,876	15.0	11, 25	0.048	1.103	1.060	0.085	0.082	0.024	0.017	0.027	0.022
19-20	69	1,320A	5.0	8,811	7.5	11, 28	0.042	4.878	4.564	0.330	0.309	0.077	0.053	0.044	0.043
R-19	70	1,560P	7.5	8,522	10.0	1, 25	0.069	5.922	3.384	0.436	0.376	0.111	0.069	0.085	[illegible]
20-M	71	1,660P	10.0	12,524	12.5	15, 18	0.063	3.231	3.860	0.328	0.391	0.087	0.078	0.086	0.074
20-N	72	1,120A	10.0	6,498	12.5	15, 18	0.094	2.180	2.003	0.330	0.303	0.088	0.061	0.087	0.073
20-21	73	880A	12.5	5,405	15.0	4, 23	0.114	1.494	1.543	0.274	0.283	0.072	0.055	0.080	0.072
21-20	74	680P	12.5	5,060	15.0	15, 26	0.114	1.082	1.297	0.199	0.238	0.055	0.050	0.064	0.043
21-0	75	940P	17.5	4,490	20.0	4, 23	0.056	1.175	0.986	0.106	0.089	0.030	0.019	0.042	0.029
0-21	76	560P	12.5	3,795	15.0	24, 19	0.056	0.736	0.753	0.066	0.068	0.022	0.017	0.025	0.023
T-22	77	750P	10.0	2,250	12.5	25, 29	0.057	2.725	1.110	0.250	0.102	0.043	0.016	0.076	0.030

[1] See Figure 8-6.

[2] A denotes AM peak hour, P denotes PM peak hour, A,P denotes equal AM and PM peaks.

[3] See Table 8-15.

TABLE B-12

TRAFFIC DATA AND RESULTING EMISSION RATES - 1991 BUILD-1000 - PLAN C

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO_x	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
1-2	1	910A	5.0	5,775	5.0	11, 14	0.051	3.685	3.932	0.302	0.323	0.065	0.055	0.039	0.035
2-1	2	740P	5.0	5,888	5.0	11, 14	0.051	2.996	4.001	0.246	0.329	0.054	0.056	0.032	0.035
A-1	3	1,230P	5.0	7,490	7.5	13, 14	0.059	4.592	3.451	0.436	0.331	0.101	0.062	0.063	0.052
1-A	4	1,020P	5.0	6,200	7.5	10, 6	0.059	4.116	2.690	0.391	0.256	0.085	0.050	0.049	0.041
1-5	5	1,350P	12.5	8,430	10.0	4, 6	0.037	2.121	2.800	0.126	0.165	0.035	0.035	0.040	0.035
5-1	6	1,090P	10.0	6,280	12.5	4, 6	0.070	2.100	1.701	0.237	0.192	0.063	0.042	0.061	0.050
C-2	7	1,650A	10.0	10,235	10.0	4, 5	0.038	3.180	3.375	0.194	0.206	0.052	0.043	0.050	0.043
3-2	8	700P	7.5	3,772	5.0	4, 14	0.067	1.762	2.568	0.190	0.277	0.045	0.047	0.037	0.030
2-3	9	1,530P	5.0	10,017	7.5	4, 14	0.067	5.650	4.656	0.609	0.402	0.143	0.094	0.082	0.079
2-6	10	940A	15.0	5,980	17.5	9, 12	0.073	1.343	1.258	0.155	0.148	0.043	0.034	0.054	0.049
3-4	11	2,020A	5.0	8,441	7.5	4, 17	0.039	7.460	3.420	0.456	0.209	0.107	0.043	0.061	0.036
3-0	12	380P	15.0	2,082	15.0	4, 13	0.065	0.507	0.509	0.053	0.053	0.016	0.116	0.020	0.016
4-3	13	310P	7.5	1,829	7.5	14, 18	0.038	1.010	0.907	0.062	0.056	0.013	0.010	0.011	0.009
7-3	14	720P	10.0	4,090	12.5	4, 13	0.069	1.387	1.179	0.154	0.131	0.041	0.028	0.040	0.032
4-8	15	1,700P	17.5	10,860	20.0	11, 14	0.066	2.183	2.088	0.232	0.222	0.065	0.052	0.094	0.085
4-7	16	30P	12.6	160	15.0	15, 19	0.024	0.027	0.015	0.001	0.001	0.000	0.000	0.000	0.000
U-4	17	1,610A	10.0	6,302	10.0	3, 12	0.100	3.072	2.215	0.494	0.357	0.133	0.071	0.124	0.070
T-4	18	30P	2.5	200	12.5	15, 19	0.024	0.027	0.023	0.001	0.001	0.000	0.000	0.000	0.000
5-8	19	520A	5.0	3,186	7.5	4, 13	0.055	1.920	1.474	0.170	0.131	0.040	0.025	0.023	0.020
6-5	20	120P	10.0	610	12.5	4, 13	0.051	0.231	0.176	0.019	0.014	0.005	0.003	0.005	0.004
9-5	21	1,140P	15.0	7,383	15.0	4, 6	0.113	1.520	1.668	0.276	0.303	0.081	0.070	0.102	0.094
6-9	22	630A	12.5	4,071	12.5	3, 5	0.102	0.977	1.093	0.160	0.179	0.045	0.052	0.049	0.045
6-7	23	50P	10.0	192	12.5	5, 7	0.060	0.097	0.053	0.009	0.005	0.002	0.001	0.002	0.001
7-6	24	140P	10.0	816	12.5	4, 6	0.060	0.270	0.221	0.026	0.021	0.007	0.005	0.007	0.006
7-8	25	50P	12.5	192	15.0	11, 7	0.050	0.087	0.045	0.007	0.004	0.002	0.001	0.002	0.001
8-7	26	90P	12.5	360	15.0	16, 20	0.050	0.183	0.106	0.015	0.009	0.003	0.002	0.004	0.003
10-7	27	860P	17.5	5,371	20.0	4, 7	0.102	1.023	0.974	0.168	0.160	0.050	0.039	0.071	0.064
8-11	28	1,520P	20.0	11,857	20.0	4, 6	0.100	1.573	2.117	0.253	0.341	0.079	0.083	0.121	0.134
9-13a	29	1,020A	10.0	4,920	12.5	3, 5	0.077	1.946	1.321	0.241	0.164	0.065	0.036	0.060	0.042
9-10	30	480P	10.0	4,992	12.5	9, 5	0.052	0.999	1.340	0.084	0.125	0.021	0.025	0.020	0.029
10-9	31	160P	12.5	888	15.0	10, 13	0.052	0.273	0.217	0.023	0.018	0.007	0.004	0.007	0.005
12-9	23	590P	10.0	3,588	12.5	4, 6	0.059	1.137	0.972	0.108	0.092	0.029	0.020	0.028	0.024
E-9	33	790P	7.5	4,873	10.0	3, 12	0.106	1.975	1.713	0.377	0.292	0.086	0.058	0.064	0.055
10-11	34	530P	12.5	4,284	15.0	10, 13	0.071	0.906	1.047	0.104	0.120	0.027	0.026	0.030	0.035
11-10	35	170P	10.0	1,020	12.5	8, 13	0.071	0.351	0.294	0.040	0.034	0.010	0.007	0.009	0.008
12-10	36	630P	10.0	4,776	12.5	10, 14	0.037	1.323	1.389	0.079	0.083	0.020	0.052	0.019	0.083
11-T	37	100P	10.0	330	12.5	17, 21	0.040	0.440	0.196	0.028	0.013	0.004	0.002	0.011	0.005
11-15	38	1,980P	10.0	14,916	12.5	5, 22	0.062	3.853	4.597	0.385	0.459	0.103	0.092	0.101	0.111
T-11	39	150P	10.0	625	12.5	17, 21	0.040	0.659	0.371	0.042	0.024	0.006	0.030	0.017	0.009
13-12	40	420P	10.0	1,752	12.5	4, 7	0.046	0.809	0.479	0.060	0.036	0.016	0.008	0.015	0.009
14-12	41	1,270P	10.0	8,184	12.5	5, 7	0.038	2.472	2.238	0.151	0.137	0.040	0.030	0.040	0.036
13-14	42	160P	7.5	1,287	10.0	3, 23	0.037	0.400	0.483	0.024	0.029	0.006	0.005	0.005	0.006
13-13a	43	740A	7.5	4,900	10.0	10, 14	0.044	2.033	1.746	0.144	0.124	0.034	0.025	0.026	0.025
13-17	44	390A	7.5	2,035	7.5	10, 23	0.044	1.072	1.000	0.076	0.071	0.018	0.013	0.014	0.010
14-13	45	1,020A	5.0	8,217	7.5	10, 14	0.037	4.116	3.819	0.245	0.227	0.054	0.042	0.031	0.036
17-13	46	810P	7.5	5,325	10.0	18, 17	0.044	1,867	1.654	0.132	0.117	0.036	0.026	0.029	0.026
13a-13	47	170A,P	10.0	968	12.5	19, 24	0.044	0.295	0.226	0.021	0.016	0.006	0.004	0.006	0.005
14-15	48	410A	7.5	2,420	10.0	4, 7	0.056	1.032	0.809	0.093	0.073	0.024	0.015	0.018	0.016
15-14	49	890P	7.5	6,545	10.0	10, 25	0.056	2.445	2.599	0.220	0.234	0.051	0.042	0.040	0.043
H-14	50	1,090A	12.5	5,490	15.0	4, 6	0.045	1.713	1.262	0.124	0.091	0.034	0.021	0.039	0.028
19-14	51	410P	10.0	2,211	12.5	8, 26	0.145	0.845	0.735	0.197	0.172	0.050	0.032	0.045	0.035
15-22	52	1,470A	10.0	6,760	12.5	3, 17	0.058	2.805	1.714	0.262	0.160	0.071	0.037	0.066	0.044
15-20	53	1,920A	10.0	10,758	12.5	5, 27	0.118	3.737	3.502	0.710	0.665	0.190	0.128	0.186	0.154
22-15	54	1,390P	7.5	6,721	10.0	10, 13	0.058	3.819	2.378	0.357	0.222	0.084	0.044	0.065	0.035
16-22	55	1,060P	12.5	5,450	15.0	4, 28	0.096	1.666	1.296	0.257	0.200	0.072	0.045	0.081	0.064
16-21	56	440AP	12.5	2,950	15.0	9, 29	0.073	0.744	0.842	0.087	0.099	0.023	0.019	0.025	0.025
16-P	57	680P	17.5	2,710	20.0	7, 30	0.082	0.815	0.610	0.108	0.081	0.031	0.017	0.041	0.023
16-I	58	670A	17.5	4,117	17.5	3, 31	0.064	0.765	0.969	0.079	0.100	0.024	0.021	0.033	0.030

TABLE B-12 (continued)

Identifier[1]		Traffic Data					Link Length	Vehicle Emissions							
		1-Hour		8-Hour		Vehicle Mix Category[3]		CO				HC		NO_x	
								(mg/m-sec)		(g/sec)		(g/sec)		(g/sec)	
Link	Link #	Volume[2] (veh/hr)	Speed (mi/hr)	Volume (veh/8-hr)	Speed (mi/hr)	1-hr, 8-hr	(mi)	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour	1-Hour	8-Hour
P-16	59	440A	15.0	2,520	17.5	7, 30	0.082	0.610	0.642	0.081	0.085	0.023	0.017	0.026	0.023
I-16	60	1,060P	12.5	7,234	17.5	2, 30	0.064	1.623	1.844	0.167	0.190	0.048	0.038	0.050	0.052
22-16	61	1,280A	5.0	6,550	17.5	3, 31	0.096	1.680	1.549	0.260	0.239	0.077	0.050	0.095	0.073
21-16	62	560P	12.5	2,920	15.0	1, 32	0.073	0.846	0.726	0.099	0.085	0.029	0.018	0.029	0.022
17-J	63	620A	5.0	3,100	7.5	10, 17	0.106	2.502	1.256	0.427	0.214	0.093	0.045	0.053	0.037
18-17	64	800P	7.5	5,716	10.0	5, 13	0.106	2.028	2.023	0.346	0.345	0.087	0.069	0.070	0.069
18-19	65	1,040P	7.5	6,555	10.0	4, 13	0.047	2.618	2.319	0.198	0.176	0.050	0.035	0.039	0.035
K-18	66	1,350P	7.5	7,744	10.0	4, 24	0.042	3.399	1.246	0.229	0.132	0.058	0.022	0.045	0.028
Q-18	67	720A	7.5	4,675	10.0	5, 23	0.066	1.825	1.756	0.193	0.187	0.045	0.035	0.039	0.036
19-L	68	700P	12.5	3,876	15.0	4, 25	0.048	1.100	1.060	0.085	0.082	0.024	0.017	0.027	0.022
19-20	69	1,420A	5.0	8,811	7.5	4, 31	0.042	5.244	4.564	0.354	0.309	0.083	0.053	0.047	0.043
R-19	70	1,540P	7.5	8,361	10.0	4, 25	0.069	3.877	3.320	0.431	0.368	0.109	0.068	0.065	0.065
20-M	71	1,660P	10.0	12,524	12.5	5, 27	0.063	3.231	4.077	0.328	0.413	0.087	0.080	0.056	0.095
20-N	72	1,110A	10.0	6,302	12.5	5, 27	0.094	2.160	2.052	0.327	0.310	0.087	0.060	0.066	0.072
20-21	73	880A	12.5	5,405	1.5	9, 29	0.114	1.487	1.543	0.273	0.283	0.072	0.035	0.079	0.072
21-20	74	680P	12.5	5,060	15.0	5, 33	0.114	1.082	1.297	0.199	0.238	0.055	0.050	0.064	0.065
21-0	75	940P	17.5	4,490	20.0	9, 29	0.056	1.167	0.986	0.105	0.089	0.030	0.019	0.041	0.029
0-21	76	560P	12.5	3,795	15.0	20, 24	0.056	0.736	0.753	0.066	0.068	0.022	0.017	0.025	0.025
T-22	77	100P	10.0	330	12.5	21, 34	0.057	0.363	0.168	0.033	0.015	0.005	0.002	0.010	0.004

[1] See Figure B-6.

[2] A denotes AM peak hour, P denotes PM peak hour, A,P denotes equal AM and PM peaks.

[3] See Table B-16.

TABLE B-13

VEHICLE MIX CATEGORIES - EXISTING CASE

Category No.	% HDG/%HDD	
	Peak Hour	Peak 8-Hour
1	2.0/2.0	4.0/3.0
2	2.0/2.5	4.0/3.5
3	1.5/1.5	4.0/2.5
4	1.5/2.0	3.5/3.5
5	1.5/2.5	4.5/3.0
6	2.0/1.5	3.5/2.5
7	2.0/1.0	3.5/3.0
8	2.5/2.0	5.0/3.0
9	2.5/1.0	3.0/3.0
10	2.0/3.0	5.0/2.5
11	1.0/3.0	5.5/1.5
12	——	5.5/2.5
13	——	6.0/3.0
14	——	6.5/2.0
15	——	5.5/3.5
16	——	4.5/3.5
17	——	5.0/3.5
18	——	5.5/3.0
19	——	5.0/1.5

TABLE B-14

VEHICLE MIX CATEGORIES - NO BUILD CASES

Category No.	% HDG/% HDD	
	Peak Hour	Peak 8-Hour
1	2.0/2.2	4.0/3.4
2	2.0/2.6	4.0/3.6
3	2.0/2.0	4.0/3.0
4	2.0/2.7	4.0/2.8
5	1.5/1.5	3.5/3.9
6	1.5/1.7	4.5/3.4
7	1.5/2.2	3.5/4.0
8	1.5/2.7	3.5/2.5
9	2.0/1.5	3.5/2.9
10	1.5/2.0	4.0/3.2
11	2.0/1.2	3.5/3.4
12	2.0/1.7	5.0/3.4
13	2.0/2.5	3.0/3.4
14	2.5/2.0	4.5/3.0
15	2.0/1.0	3.0/2.5
16	2.5/1.0	4.0/2.5
17	2.0/3.0	3.0/3.0
18	1.0/3.0	5.5/2.0
19	——	5.0/2.9
20	——	5.0/3.0
21	——	5.5/2.5
22	——	6.0/3.0
23	——	5.0/1.5
24	——	6.5/2.0
25	——	5.5/3.5
26	——	5.0/3.5
27	——	5.5/3.0

TABLE B-15

VEHICLE MIX CATEGORIES - BUILD-2500 CASE

Category No.	% HDG/% HDD	
	Peak Hour	Peak 8-Hour
1	2.0/2.4	4.0/3.4
2	2.0/2.2	4.0/3.6
3	2.0/2.8	4.0/3.8
4	2.5/2.2	4.0/3.0
5	2.5/3.0	4.5/3.2
6	0.0/100.0	3.6/3.6
7	2.0/2.0	4.5/3.4
8	1.5/1.5	4.5/4.0
9	1.5/1.7	0.0/100.0
10	2.5/2.5	3.5/2.5
11	2.0/2.6	3.5/2.9
12	2.2/2.4	4.0/4.0
13	2.2/2.0	4.2/3.6
14	5.0/40.0	4.2/3.0
15	2.0/3.0	4.2/3.4
16	1.5/2.0	4.5/3.8
17	0.0/2.2	8.0/40.0
18	1.5/2.8	5.0/4.0
19	2.0/1.2	3.0/3.0
20	1.8/2.0	0.0/3.4
21	2.5/1.0	5.0/3.4
22	2.0/1.5	5.5/2.0
23	2.0/1.0	6.0/3.0
24	1.0/3.0	6.5/2.0
25	5.0/20.0	5.5/3.5
26	—	5.0/3.0
27	—	5.0/1.5
28	—	5.5/3.0
29	—	8.0/20.0

TABLE B-16

VEHICLE MIX CATEGORIES - BUILD-1000 CASE

Category No.	% HDG/% HDD	
	Peak Hour	Peak 8-Hour
1	2.0/1.0	4.0/1.0
2	2.0/1.5	4.0/1.5
3	2.0/2.0	4.0/2.0
4	2.0/2.5	4.0/2.5
5	2.0/3.0	4.0/3.0
6	2.0/3.5	4.0/3.5
7	2.5/1.0	4.0/4.0
8	2.5/1.5	4.5/1.0
9	2.5/2.0	4.5/1.5
10	2.5/2.5	4.5/2.0
11	2.5/3.0	4.5/2.5
12	2.5/3.5	4.5/3.0
13	2.0/4.0	4.5/3.5
14	3.5/4.0	4.5/4.0
15	0.0/0.0	3.5/2.5
16	3.5/3.5	3.5/3.0
17	5.0/40.0	3.5/3.5
18	1.5/3.0	5.0/4.5
19	1.5/2.0	0.0/0.0
20	1.0/3.0	6.0/4.5
21	5.0/20.0	8.0/40.0
22	—	5.0/4.0
23	—	5.0/3.5
24	—	3.0/3.0
25	—	5.5/3.5
26	—	6.0/2.0
27	—	5.5/4.0
28	—	4.0/5.0
29	—	6.0/3.0
30	—	6.5/2.0
31	—	5.5/3.0
32	—	5.0/1.5
33	—	5.0/3.0
34	—	8.0/20.0

APPENDIX C

CARBON MONOXIDE/METEOROLOGICAL MEASUREMENT PROGRAM

C.1 Monitoring Objective

To support the CO impact assessments, a three month air quality/meteorological measurement program was designed and implemented in the South Station area. The program consisted of two monitoring locations, where CO concentration, wind speed and wind direction were measured continuously and coincidently. Monitoring began on October 1, 1974 and extended through December 31, 1974. The objectives of the measurement program were:

1. to determine existing background CO levels, and
2. to collect meteorological measurements to support the definition of worst case dispersion conditions for CO sources within the project area.

Background CO is defined as that project area CO level representative of the South Station area and not unduly influenced by one or more individual sources. These background CO levels are added to predicted (modeled) facility-related CO levels to yield predictions of total ambient CO concentrations.

C.2 Monitoring Site Selection

The primary objective of site selection in this study was to provide proper instrument exposure for the measurement of background CO levels indicative of the project area. This required that the monitors be exposed such that undue influences from a particular source(s), in this case vehicular CO emissions, be avoided. In examining the project area it became apparent that the northern and southern portions represented potentially different CO air quality regimes. The northern portion is dominated by tall buildings, street canyons, and commercially-oriented traffic patterns on small narrow streets. In the southern portion, there is noticeably less building influence and traffic patterns

are characterized by heavy commuter traffic on the Southeast Expressway, the Massachusetts Turnpike and their associated interchanges. Due to this apparent disparity within the area, two monitoring site locations were deemed necessary to define these potentially different CO background regimes.

In the northern portion of the project area, the monitoring shelter (Figure C-1) was located in a vacant lot on the corner of Essex Street and Atlantic Avenue. The shelter was placed in the center of the lot with a clearance of 60 feet from traffic on Essex Street. With this 60 foot clearance and the relatively low traffic volumes on Essex Street, the location offered adequate exposure for background monitoring purposes. The site is designated as monitoring location L on Figure C-2, and is known as the Roselot Site.

In the southern portion of the project area, the instrumentation was placed in the railroad track area south southeast of the intersection of Kneeland Street and Atlantic Avenue. This location was selected since it provided excellent background monitoring exposure. The monitor was located over 200 feet from the intersection of Kneeland Street and Atlantic Avenue, and approximately 800 feet from the Southeast Expressway. With this much clearance from these traffic areas the undue source influence criteria is clearly met. In addition, with no significant obstructions to effect wind direction, the meteorological instrumentation exposure was also excellent. The site is known as the Tracks Site and is designated site M on Figure C-2.

C.3 Monitoring Instrumentation and Procedures

Continuous measurements of CO concentrations at each monitoring site were made using the URAS-2 non-dispersive infrared (NDIR) gas analyzer manufactured by the Intertech Corporation, Princeton, New Jersey. The analytical method upon which this instrument is based is an EPA reference method, chosen by ERT on the basis of its operating characteristics, accuracy, low maintenance requirements, and proven dependability. Each instrument was modified with a humidity control installed upstream of the analysis section to ensure constant sample humidity. Continuous wind speed and wind direction measurement equipment

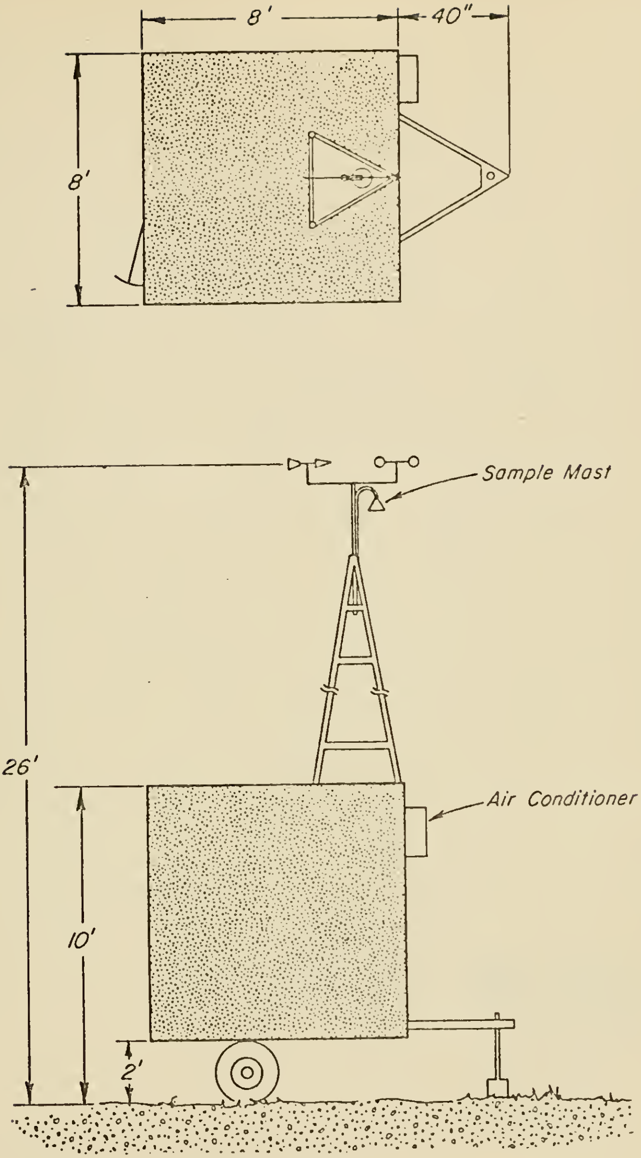
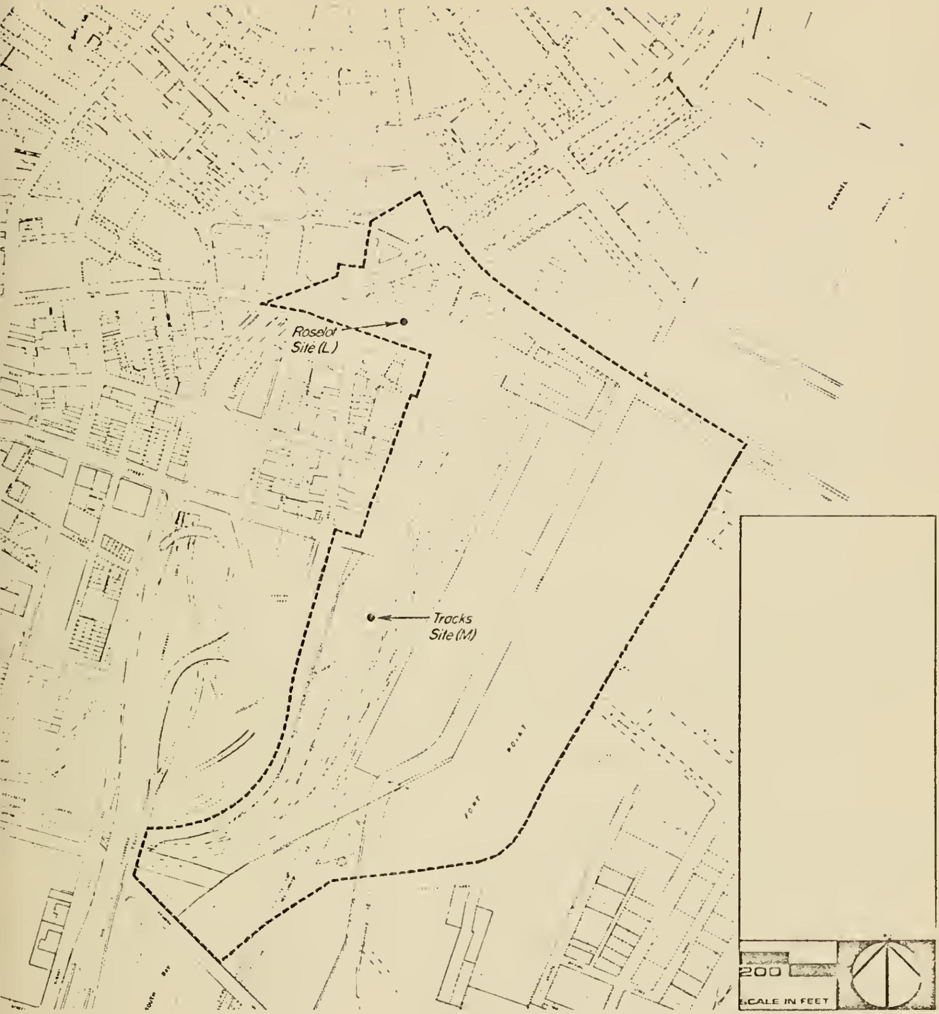


Figure C-1 Schematic of Monitoring Shelter



FIGURE

Figure C-2 Location of Air Quality/Meteorological Monitoring Sites

BOSTON
REDEVELOPMENT
AUTHORITY

SOUTH STATION
ENVIRONMENTAL IMPACT REPORT

ENVIRONMENTAL RESEARCH & TECHNOLOGY INC

included a CLIMET Instrument Wind System, consisting of a Model WD-012-10 Wind Direction Transmitter and a Model WS-011-1 Wind Speed Transmitter, and a Leeds & Northrup XL 602 recorder. Both the URAS-2 instrument and the wind measurement recorder at each site were housed in a fully-insulated, weatherproofed shelter equipped with a thermostatically controlled heating and ventilation system. The wind system was mounted atop a 5 meter tripod on the roof of the 3 m high shelter. The CO sampling probe extended approximately 3 meters vertically from the top of the shelter.

Instrument operation was checked 3 times each week by an ERT field technician. The URAS-2, a self-zeroing instrument, was checked for both zero and span adjustment using zero and span reference gases. Charts were removed each week and returned to ERT for processing.

C.4 Measured CO Levels

Hourly averaged CO levels measured at the Roselot Site are presented in Tables C-1, C-2, and C-3 for the months of October, November, and December respectively. The corresponding hourly measurements for the Tracks Site are presented in Tables C-4, C-5, and C-6. The diurnal variation of average hour CO levels over the three month period are presented in Figure C-3.

Running eight-hour averages for the Roselot Site are presented in Tables C-7, C-8, and C-9; the corresponding running eight-hour averages for the Tracks Site are given in Tables C-10, C-11, and C-12. Tables C-13 and C-14 summarize the diurnal variation of maximum monitored one-hour and running eight-hour CO levels for each monitoring site. A tabulation of the highest and second highest one-hour and non-overlapping eight-hour averages are given in Table C-15.

C.5 Measured Wind Speed and Wind Direction

Wind speed and wind direction measurements for the three month period at the Roselot Site are summarized in Tables C-16 through C-21. The corresponding measurements for the Track Site are presented in Tables C-22 through C-27. Wind roses generated from this data, which graphically delineate the percent frequency of occurrence of each wind speed class by wind direction, are shown in Figures C-4 and C-5 for each site.

TABLE C-1
SOUTH STATION AIR QUALITY STUDY

L ROSELOT

CARBON MONOXIDE CONCENTRATION (PPM)

DATA FOR OCTOBER 1974

HOURS (LST)

DAY																									AVG
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	2.6	2.5	2.6	3.2	3.5	3.5	3.6	3.9	4.6	4.0	4.2	3.5	3.1	2.9	2.4	2.6	3.5	3.0	2.8	2.8	2.8	2.4	2.4	2.9	3.2
2	4.0	3.5	3.1	2.6	2.1	2.4	2.8	3.5	4.2	4.5	4.1	3.8	3.6	3.5	3.7	4.4	5.1	5.4	4.3	3.4	3.4	4.0	3.8	3.6	3.7
3	3.2	2.8	2.7	2.6	2.5	2.7	3.2	3.3	3.2	3.1	3.0	2.8	2.7	2.8	3.0	3.6	4.8	5.7	4.6	3.8	3.3	3.1	3.3	3.4	3.3
4	3.3	2.9	2.7	2.8	2.8	2.8	2.8	2.9	2.9	3.2	3.1	3.0	3.0	2.6	2.1	2.0	2.5	3.2	3.3	3.5	2.9	2.6	2.3	2.4	2.8
5	2.0	1.9	1.8	1.7	1.4	1.1	1.1	1.0	1.0	1.3	1.6	1.7	1.7	1.7	1.7	1.4	1.5	2.1	2.1	2.0	2.5	3.0	2.6	2.8	1.8
6	2.8	2.7	2.4	2.4	2.2	2.1	1.7	1.9	2.2	2.7	2.8	2.8	1.7	1.7	2.2	2.1	2.3	2.6	3.2	3.6	3.4	2.6	2.5	2.3	2.5
7	1.8	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.1	2.3	2.1	1.9	1.9	1.9	1.9	2.3	2.6	2.6	2.2	1.8	1.6	1.5	1.1	1.1	1.9
8	1.3	1.0	1.0	1.0	1.0	1.0	1.3	2.7	3.9	3.7	2.9	2.2	1.8	1.8	1.9	2.0	2.5	2.2	1.5	1.0	1.0	1.8	3.0	4.5	2.0
9	3.4	3.0	2.6	2.0	1.6	1.4	1.8	3.0	4.4	4.6	2.8	1.6	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	2.0	2.4	2.0
10	3.0	3.0	3.3	3.2	2.7	2.5	3.5	4.1	4.0	3.8	3.6	3.4	3.1	2.8	2.6	2.5	2.6	3.1	3.5	2.7	2.1	1.6	2.0	2.2	3.0
11	1.3	1.5	1.1	1.0	1.0	1.0	1.0	1.5	2.5	2.6	2.5	2.0	2.0	2.5	2.6	3.5	3.6	3.1	2.4	2.3	2.4	2.6	3.1	3.4	2.2
12	3.5	3.2	3.0	2.8	2.4	2.1	1.9	1.8	1.9	2.0	2.1	1.9	1.7	1.8	1.9	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.9	2.2
13	3.5	2.7	2.1	1.7	1.2	1.0	1.0	1.0	1.1	1.5	1.7	1.8	2.1	2.0	1.6	1.2	1.0	1.0	1.0	1.0	1.1	1.3	1.3	2.4	1.6
14	2.3	2.6	3.0	3.2	2.7	2.1	2.2	2.5	2.5	2.0	1.3	1.1	1.1	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	1.0	1.5	1.7
15	1.5	1.2	1.2	1.1	1.0	1.0	1.4	2.6	4.1	4.4	4.0	3.3	3.5	3.9	3.8	3.7	4.5	5.1	3.5	1.6	1.0	1.3	1.6	1.7	2.6
16	1.7	2.0	2.1	2.1	1.8	1.8	2.7	3.3	3.3	2.9	2.5	2.6	2.6	2.5	1.8	2.3	4.0	5.5	5.2	3.9	2.9	2.1	1.8	1.7	2.7
17	1.9	1.6	1.6	1.3	1.1	0.9	1.3	2.7	4.2	4.5	3.7	2.1	1.6	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9
18	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	2.1	2.2	2.5	3.3	3.9	3.0	2.6	2.5	2.4	2.2	2.0	1.9	2.2	99.9
19	2.8	2.5	2.0	1.3	1.1	1.3	1.7	2.1	1.9	1.6	1.7	1.7	1.7	1.9	2.1	2.5	2.2	2.1	2.0	2.0	2.1	2.1	2.3	1.9	1.9
20	1.9	1.6	1.4	1.1	1.0	1.1	1.4	1.5	1.5	1.5	1.6	1.5	1.6	1.6	1.7	1.6	1.6	1.7	1.7	1.4	1.6	1.7	1.8	1.5	1.5
21	1.4	1.6	1.9	1.9	2.0	2.4	3.3	3.8	2.9	2.4	2.3	2.3	2.5	2.5	2.8	4.1	4.2	3.5	2.9	2.9	2.8	4.4	4.1	3.0	2.8
22	2.2	2.5	2.0	1.7	1.3	2.1	3.0	3.8	3.5	2.8	2.2	1.9	1.8	2.1	2.5	2.5	2.4	2.5	2.4	2.1	1.7	1.9	2.3	2.1	2.3
23	1.9	1.8	1.1	1.0	1.0	1.5	2.8	4.3	5.0	3.4	1.9	1.2	1.2	1.9	3.4	5.1	6.5	6.1	4.0	2.5	1.9	1.6	1.7	1.2	2.7
24	1.8	2.1	1.5	1.2	1.1	1.0	1.6	2.5	3.0	2.9	2.6	2.1	1.7	1.7	2.4	3.5	4.0	3.7	3.0	2.1	1.7	1.3	2.0	2.4	2.2
25	1.0	1.0	1.7	1.8	1.5	1.4	1.0	1.0	1.0	1.0	1.1	1.9	2.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	99.9	99.9	99.9	99.9	1.2
26	3.3	2.6	1.9	1.0	1.0	1.0	1.0	1.0	1.1	1.4	1.8	2.1	2.3	2.3	2.4	2.6	2.7	2.6	3.0	2.3	2.4	2.3	2.1	1.6	2.0
27	2.0	2.0	2.1	1.8	1.3	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.3	1.6	1.6	1.4	1.4	1.6	1.7	1.6	1.6	1.4
28	1.4	1.3	1.3	1.3	1.0	1.0	1.0	1.1	1.4	1.5	1.1	1.0	1.0	3.0	2.9	2.8	2.7	2.7	2.8	2.7	2.6	2.7	2.9	3.0	1.9
29	3.2	3.0	2.6	2.0	1.8	1.7	2.3	3.2	2.9	2.7	2.4	2.5	2.4	2.3	2.4	3.0	3.5	3.7	3.1	2.1	1.9	2.0	2.5	2.5	2.6
30	2.0	1.9	1.8	1.7	1.5	1.7	2.1	3.4	4.7	5.3	4.8	4.5	4.5	4.9	5.2	5.5	5.7	6.1	5.0	3.6	2.5	2.0	2.5	2.6	3.5
31	3.8	4.5	3.5	1.8	1.8	2.3	3.0	3.6	4.2	3.4	2.8	2.7	2.7	2.4	2.5	3.2	4.8	4.9	3.7	2.7	2.0	1.7	1.7	1.8	3.0
	2.4	2.5	2.1	1.9	1.7	1.7	2.0	2.5	2.9	2.8	2.5	2.3	2.2	2.2	2.4	2.7	3.0	3.1	2.7	2.3	2.1	2.1	2.2	2.4	
	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	31.	31.	30.	30.	30.	30.	30.	30.	30.	29.	29.	29.	29.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 718 NUMBER OF MISSING HOURS = 26 DATA CAPTURE = 96.51 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 2.356 MAXIMUM HOURLY VALUE = 6.500MAXIMUM VALUE OCCURED ON DAY 23 , HOUR ENDING 17

TABLE C-2

SOUTH STATION AIR QUALITY STUDY

L   ROSELOT   CARBON MONOXIDE CONCENTRATION (PPM)   DATA FOR NOVEMBER 1974

HOURS (LST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	AVG
1	2.2	2.8	2.9	2.5	1.8	1.7	2.3	3.1	3.7	3.1	2.6	2.6	3.0	3.3	3.5	4.4	5.4	6.3	5.2	4.0	3.8	3.6	3.1	2.1	3.3
2	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.4	1.3	1.3	1.5	1.4	1.3	1.2	1.3	1.7	1.7	1.6	1.4	1.4	1.9	1.8	1.6	1.4
3	1.8	1.4	1.5	1.6	1.6	1.4	1.3	1.3	1.0	1.0	1.1	1.0	1.0	1.0	1.3	2.1	2.1	2.0	2.0	2.5	3.7	4.8	4.7	3.2	1.9
4	2.0	1.5	1.1	1.0	1.0	1.0	1.0	1.4	2.0	1.9	2.1	2.1	2.0	1.6	3.2	4.9	8.9	9.2	6.0	4.0	3.5	5.3	4.0	2.9	3.1
5	2.2	1.9	1.4	1.3	1.5	1.5	2.0	3.4	4.8	4.5	3.2	2.7	2.4	2.3	2.5	2.6	2.9	2.9	2.8	2.5	2.4	2.1	2.0	2.0	2.5
6	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.4	2.5	3.3	3.7	3.5	2.7	1.9	2.3	2.5	3.3	5.0	6.2	6.5	5.5	3.5	2.7	3.5	2.8
7	3.9	2.7	1.7	1.0	1.0	1.0	1.4	2.6	3.8	4.0	3.7	3.4	3.4	3.7	3.9	5.1	7.0	7.0	4.5	3.1	2.8	2.8	2.3	2.1	3.2
8	2.0	1.6	2.2	2.3	2.4	2.7	3.0	5.2	5.7	5.3	4.7	4.4	4.5	4.0	3.3	4.9	5.5	4.1	2.4	1.0	1.0	1.0	1.0	1.9	3.2
9	1.3	1.0	1.0	1.0	1.0	1.1	1.5	1.1	1.0	1.1	1.4	1.7	1.9	2.0	2.1	2.8	4.2	4.8	4.4	3.4	2.8	2.8	2.6	2.7	2.1
10	2.2	2.3	2.2	2.2	2.3	2.0	1.4	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.7	2.1	1.7	1.9	3.4	5.0	4.2	1.9
11	4.0	3.3	2.9	2.6	2.2	2.4	3.1	5.6	7.8	5.8	2.5	2.2	1.9	1.7	1.6	2.1	2.9	3.5	3.1	1.1	1.0	1.0	1.1	2.0	2.8
12	1.9	1.3	1.2	1.4	1.6	1.8	1.7	1.5	1.7	1.0	1.0	1.0	1.3	1.4	1.7	1.8	2.5	2.8	2.3	1.9	1.6	1.6	1.6	2.0	1.6
13	1.8	1.4	1.0	1.0	1.1	1.8	2.0	2.2	2.4	2.5	2.6	2.7	3.0	3.2	3.3	3.5	3.8	4.0	3.8	3.1	2.6	2.2	2.0	1.9	2.5
14	1.6	1.5	1.3	1.5	1.9	2.2	2.5	3.5	4.7	3.9	2.0	1.2	1.0	1.1	99.9	1.4	1.7	2.1	2.0	1.5	1.3	1.1	1.2	1.4	1.9
15	1.5	1.4	1.1	1.0	1.0	1.0	1.0	1.2	1.7	1.7	2.0	2.3	2.1	2.2	2.6	3.0	4.1	4.7	3.6	2.8	2.9	3.0	3.1	3.0	2.2
16	2.1	2.1	2.1	2.0	1.7	1.6	1.9	2.2	2.3	2.5	2.5	2.5	2.7	2.9	3.1	3.2	3.2	5.0	3.0	3.0	3.0	3.3	3.8	4.1	2.7
17	2.9	2.6	2.7	2.3	1.9	1.7	1.7	1.8	2.1	2.3	2.4	2.4	2.6	2.6	2.4	2.4	2.5	2.9	3.5	4.2	4.2	4.7	3.9	3.4	2.8
18	2.9	2.7	2.8	2.2	1.7	1.4	1.7	2.7	3.7	3.7	3.3	2.5	2.5	2.5	2.9	2.9	2.4	6.5	4.8	5.1	4.3	4.2	4.0	4.4	3.2
19	3.6	3.5	3.5	3.2	2.3	2.3	3.0	4.4	6.5	6.4	3.3	1.9	1.6	1.8	1.9	2.8	5.6	6.1	4.5	4.2	3.6	4.0	9.7	10.1	4.2
20	11.9	8.3	6.9	4.0	3.3	2.7	2.7	3.1	3.6	3.5	2.7	2.0	1.4	1.1	1.6	1.9	1.8	1.9	1.8	1.5	2.3	3.9	5.2	5.0	3.5
21	2.6	2.1	2.4	2.4	1.6	1.0	1.0	1.3	2.1	2.3	2.2	2.3	2.6	1.9	2.0	2.2	3.4	4.2	2.6	1.7	1.0	1.0	1.1	1.0	2.0
22	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	2.2	2.5	2.3	2.4	2.4	1.9	2.3	3.6	3.2	3.2	2.7	1.9	1.6	2.0	2.1	2.1	1.9
23	2.4	1.5	1.2	1.3	1.7	1.7	1.6	2.1	2.5	3.1	2.6	2.0	1.0	0.8	1.3	1.7	2.1	2.6	3.1	3.2	2.8	2.5	2.8	3.1	2.1
24	2.8	3.1	3.4	3.0	2.3	1.5	1.4	1.6	1.3	1.0	1.1	1.8	1.4	1.0	1.0	1.0	2.1	2.4	2.0	1.6	1.5	2.0	2.3	2.1	1.9
25	2.0	1.9	2.3	1.9	1.5	1.8	1.7	3.3	4.8	5.4	4.4	4.3	4.0	4.0	4.3	4.7	6.5	6.1	3.4	2.5	2.1	1.7	1.3	1.5	3.2
26	2.4	1.9	1.5	1.2	1.3	1.5	1.7	1.9	2.1	2.2	2.3	2.5	2.3	2.1	2.0	2.1	2.3	2.5	2.4	2.0	1.7	1.4	1.1	1.0	1.9
27	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.6	4.6	4.9	4.3	3.7	4.8	6.3	6.7	5.1	3.5	2.7	2.4	2.1	2.0	2.7
28	2.2	1.7	1.6	1.6	1.6	1.8	1.6	1.7	1.5	1.9	2.2	2.2	1.8	1.7	1.3	1.1	1.4	2.6	4.1	5.5	6.2	3.7	3.0	3.5	2.4
29	3.8	3.0	2.5	2.2	2.2	2.1	1.9	1.9	2.4	2.9	3.1	3.0	2.9	2.9	2.8	2.9	3.1	3.4	3.1	2.9	2.9	2.9	2.7	2.5	2.7
30	2.3	2.2	2.2	1.9	1.8	1.6	1.5	1.5	1.6	1.7	1.9	2.1	2.1	2.0	1.8	1.7	2.0	2.8	2.6	2.2	2.3	3.1	4.2	4.0	2.2
	2.6	2.2	2.0	1.8	1.6	1.6	1.7	2.2	2.8	2.8	2.5	2.4	2.3	2.2	2.3	2.8	3.5	4.0	3.4	2.8	2.7	2.8	2.9	2.9	
	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	29.	30.	30.	30.	30.	30.	30.	30.	30.	30.	

TOTAL HOURS = 720   NUMBER OF GOOD HOURS = 719   NUMBER OF MISSING HOURS = 1   DATA CAPTURE = 99.86 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 2.533   MAXIMUM HOURLY VALUE = 11.900MAXIMUM VALUE OCCURED ON DAY 20 , HOUR ENDING 1

TABLE C-3

SOUTH STATION AIR QUALITY STUDY

L RO II LOT

CARBON MONOXIDE CONCENTRATION (PPM)

DATA FOR DECEMBER 1974

HOURS (LST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	AVG
1	4.5	3.6	1.3	3.1	3.1	3.0	2.9	2.9	2.7	2.4	2.4	2.2	1.9	1.6	1.7	1.4	1.0	1.0	1.0	1.0	1.0	1.4	1.5	1.2	2.2
2	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	2.1	4.5	3.0	4.2	6.2	6.4	4.3	3.5	1.5	1.3	1.6	1.7	2.2
3	1.6	1.1	1.0	1.0	1.0	1.0	1.1	2.2	3.1	3.3	2.8	2.6	2.3	2.0	2.3	2.9	4.4	4.1	1.8	1.2	1.1	1.4	1.2	1.0	2.0
4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.5	1.9	1.3	1.2	1.7	2.3	2.9	3.3	4.6	5.6	4.1	2.9	2.5	1.8	1.2	1.3	2.0
5	1.7	1.3	1.0	1.0	1.0	1.0	1.0	1.1	1.8	1.8	1.4	1.0	1.0	1.0	1.8	3.3	5.4	7.0	5.7	3.9	3.8	4.0	4.2	4.0	2.5
6	4.4	4.4	4.2	3.6	3.1	3.2	4.0	5.6	7.4	6.9	5.5	4.6	4.2	3.5	1.8	2.8	4.8	5.0	5.0	4.6	5.0	6.5	7.6	6.9	4.8
7	8.8	7.3	7.8	6.0	5.6	5.5	5.8	6.5	5.8	5.3	4.2	3.3	3.2	3.0	2.1	2.3	3.5	5.6	7.7	8.5	6.9	7.2	7.4	11.3	5.9
8	5.1	3.3	2.3	2.0	2.1	2.2	2.0	1.9	1.8	1.6	1.7	1.8	1.7	1.7	1.8	2.0	2.5	3.3	2.5	1.6	1.4	1.4	1.3	1.5	2.1
9	1.5	1.1	1.0	1.0	1.0	1.2	2.4	3.1	3.2	3.3	3.5	2.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5
10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
12	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
13	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
16	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	2.3	1.9	1.3	1.2	1.2	1.0	1.0	1.9	2.0	1.3	1.2
17	1.1	1.5	1.5	1.7	1.8	1.7	2.1	3.1	4.3	3.8	3.4	3.4	3.6	3.9	4.1	5.1	6.6	6.9	5.1	4.0	3.7	3.4	3.1	2.7	3.4
18	2.1	2.0	1.9	1.5	1.6	1.7	2.0	3.4	4.1	3.7	2.9	2.8	3.0	3.0	2.6	2.9	5.5	5.1	3.2	2.9	3.0	2.3	2.3	2.0	2.8
19	1.1	1.6	1.9	1.4	1.5	1.6	2.0	3.5	4.8	3.7	3.2	3.1	2.6	2.4	2.7	2.9	3.7	4.5	3.0	2.9	2.1	1.4	2.0	2.3	2.6
20	2.1	2.5	2.2	2.1	1.7	1.5	1.6	3.1	4.6	4.7	3.1	3.0	3.1	2.5	2.1	2.7	2.7	3.3	1.5	1.6	2.1	2.2	2.4	2.7	2.6
21	2.2	1.8	1.7	2.1	2.1	1.7	1.5	2.0	1.6	1.8	1.5	1.8	2.3	2.8	2.9	2.5	1.6	1.4	1.6	1.3	3.7	4.5	3.5	3.5	2.2
22	2.1	1.6	2.0	1.1	1.0	1.0	1.2	1.4	1.5	1.3	1.8	1.7	1.8	1.8	2.1	2.1	1.7	2.3	2.3	1.9	2.4	2.5	2.4	2.0	1.8
23	2.1	1.8	2.5	2.3	2.2	2.2	2.7	4.2	6.2	5.5	5.0	4.3	4.1	4.3	4.6	4.5	5.0	4.6	3.8	2.5	3.0	2.6	3.0	3.2	3.6
24	2.3	2.4	1.9	1.4	1.5	1.7	1.8	2.9	3.9	3.2	3.1	3.1	3.9	4.1	3.4	3.8	4.0	3.5	3.1	2.6	3.1	3.3	2.8	2.3	2.9
25	1.8	1.9	1.9	1.8	1.5	1.3	1.4	1.4	1.7	1.3	1.1	1.3	3.0	2.8	1.7	1.3	1.3	1.4	2.1	2.7	2.5	2.1	2.4	2.5	1.8
26	1.1	1.6	1.5	1.5	1.7	1.9	2.4	3.1	3.6	3.3	2.8	2.8	3.2	3.4	2.9	3.4	5.3	6.5	3.4	2.9	2.6	2.4	3.7	3.3	2.9
27	2.1	2.5	2.0	2.2	1.8	2.1	3.6	4.3	4.7	3.5	3.3	2.6	3.2	3.6	4.0	4.7	5.7	5.1	2.9	3.5	3.0	2.9	2.7	3.2	3.3
28	2.1	1.9	1.7	1.5	1.4	1.3	1.4	1.7	1.7	2.1	2.1	1.8	1.6	1.7	2.2	2.8	2.8	3.5	2.7	2.8	2.2	2.4	4.8	4.5	2.3
29	4.2	3.3	4.2	2.9	2.6	1.8	1.7	1.9	1.6	1.4	1.4	1.5	1.6	1.7	1.6	2.3	2.3	2.1	2.0	1.6	1.8	2.0	1.4	1.8	2.1
30	1.2	1.4	1.4	1.4	1.0	1.7	1.9	3.0	3.2	3.3	3.8	4.2	3.6	2.5	2.0	3.3	4.4	4.3	2.8	1.9	1.9	1.5	1.6	2.3	2.5
31	2.2	1.2	1.0	1.0	1.0	1.0	1.0	2.2	4.3	3.4	2.2	2.1	2.2	2.2	2.0	2.1	2.4	1.4	1.4	1.4	1.0	1.3	1.5	1.4	1.8
	2.3	1.1	1.9	1.7	1.6	1.6	1.8	2.4	2.8	2.6	2.3	2.2	2.2	2.3	2.2	2.5	3.1	3.3	2.6	2.3	2.2	2.3	2.4	2.5	
	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 744 NUMBER OF MISSING HOURS = 0 DATA CAPTURE = 100.00 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 2.296 MAXIMUM HOURLY VALUE = 11.300MAXIMUM VALUE OCCURED ON DAY 7 , HOUR ENDING 24

TABLE C-4

SOUTH STATION AIR QUALITY STUDY

M TRACKS CARBON MONOXIDE CONCENTRATION (PPM) DATA FOR OCTOBER 1974

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	AVG
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.1	2.0	2.3	1.9	2.1	2.0	1.7	1.6	1.6	2.0	2.0	1.5	1.3	1.0	1.0	1.0	1.3	1.5
2	1.6	2.1	2.5	2.0	2.5	2.0	2.0	2.5	3.1	3.0	2.4	2.2	2.2	2.6	3.0	3.1	3.1	2.9	2.1	1.2	1.0	1.0	1.0	1.4	2.2
3	2.1	1.8	1.6	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.2	1.1	1.0	1.1	1.7	2.2	2.2	1.7	1.7	1.6	1.4	1.7	1.4
4	1.6	1.7	1.7	2.2	2.6	2.5	2.4	2.8	2.9	2.2	1.5	1.6	1.7	2.0	2.5	2.8	3.0	3.0	2.9	3.2	3.0	2.7	2.4	2.7	2.4
5	3.2	3.1	2.3	1.7	1.7	1.3	1.0	1.0	1.2	1.3	1.4	1.4	1.7	2.2	2.7	2.8	2.7	2.8	3.1	3.7	3.3	2.5	2.0	1.9	2.2
6	2.1	2.0	1.6	1.6	1.5	1.5	1.5	1.8	2.0	2.4	2.6	2.8	3.3	3.8	3.7	3.9	4.0	4.5	5.1	4.3	2.9	2.4	2.3	2.3	2.8
7	2.1	1.9	1.2	0.8	1.3	1.8	2.9	3.5	6.0	7.1	6.7	6.3	7.0	6.4	6.3	6.2	5.7	5.0	4.2	3.1	2.6	2.3	1.6	1.0	3.9
8	1.0	1.0	1.0	1.2	1.5	1.9	3.2	3.8	2.0	2.0	1.9	1.8	1.6	1.0	0.8	1.1	1.2	1.3	1.5	1.7	2.6	3.4	5.4	4.8	2.0
9	3.9	3.0	1.8	1.6	1.8	2.5	4.0	4.5	3.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.4	1.6	2.0	1.8	1.6
10	1.3	1.6	1.7	1.7	1.6	2.5	4.7	5.0	2.4	1.8	2.6	3.1	2.8	2.9	3.0	2.6	2.6	2.6	2.2	1.6	1.3	1.5	1.7	1.2	2.3
11	1.0	1.2	1.4	1.4	1.4	2.1	3.0	3.4	2.8	1.8	3.3	5.4	5.2	4.7	4.1	3.7	3.7	3.4	2.9	2.6	3.0	3.0	2.9	2.2	2.9
12	2.6	2.8	2.3	2.3	2.3	2.5	2.6	2.5	2.7	2.6	2.3	2.1	2.1	2.4	2.9	3.1	3.0	2.7	2.4	2.7	3.2	3.2	2.7	3.2	2.6
13	4.2	3.4	1.9	1.6	1.5	1.3	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.4	1.5	1.3	1.0	1.6	2.2	1.5
14	2.5	2.7	2.8	3.2	2.7	2.5	2.7	3.2	2.9	1.8	1.0	1.0	1.0	1.1	1.3	1.3	1.0	1.0	1.0	1.4	1.6	2.1	1.8	1.2	1.9
15	1.0	1.0	1.0	1.0	1.0	1.4	2.8	3.6	3.6	2.5	2.7	2.9	3.2	3.3	3.5	3.6	3.5	2.9	1.8	1.6	1.5	1.1	1.0	1.0	2.2
16	1.2	1.1	1.0	1.0	1.0	1.0	1.2	1.4	1.5	1.0	1.0	1.0	2.3	4.0	3.8	3.9	4.2	4.1	3.6	3.3	3.0	2.7	2.1	1.2	2.1
17	1.0	1.0	1.0	1.0	1.0	1.0	1.5	2.7	3.1	2.4	1.1	1.0	2.2	2.4	1.9	1.6	1.4	1.3	1.5	1.9	2.4	2.6	2.8	2.7	1.8
18	2.0	1.6	1.4	1.1	1.0	1.0	1.2	1.4	1.5	1.3	1.0	1.8	1.8	1.3	1.2	1.4	1.6	1.5	1.2	1.1	1.2	1.0	1.0	1.3	1.3
19	1.9	2.0	1.6	1.1	1.0	1.0	1.4	1.7	2.0	2.1	2.0	1.6	1.3	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.4	1.1	1.3
20	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.2	1.0	1.0
21	1.0	1.0	1.0	1.0	1.0	1.0	1.4	2.1	1.2	1.0	1.0	1.0	1.4	1.7	2.0	2.1	2.2	2.4	2.7	2.6	2.6	3.9	3.6	3.1	1.8
22	2.2	1.8	1.5	1.5	1.7	2.3	3.6	4.2	2.9	1.7	1.4	1.4	1.4	1.7	2.6	4.2	4.9	4.2	3.3	2.4	2.0	2.1	2.4	1.9	2.5
23	1.8	1.9	2.6	2.5	1.9	2.2	3.4	6.2	6.9	5.1	2.4	2.4	2.7	2.7	2.8	3.6	4.7	3.7	3.4	3.2	2.2	1.4	1.1	1.0	3.0
24	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.4	1.7	1.2	1.0	1.0	1.6	2.0	2.0	2.3	2.5	2.2	2.7	1.4	1.5	2.1	2.4	2.3	1.6
25	1.8	1.8	2.0	2.1	2.5	3.0	3.7	3.7	3.2	2.6	2.4	2.1	2.1	2.6	4.0	4.9	4.2	3.2	2.5	2.0	1.6	1.6	1.6	1.7	2.6
26	2.4	2.4	2.2	2.0	1.7	1.6	1.3	1.3	1.5	1.1	1.0	1.0	1.2	1.4	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3
27	1.7	1.7	1.6	1.1	1.0	1.0	1.0	1.0	1.1	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.3	1.1
28	1.1	1.0	1.0	1.0	1.2	1.5	1.9	2.1	2.1	1.7	1.4	1.1	1.1	1.0	1.3	1.5	1.5	2.0	1.9	2.3	2.4	2.3	2.3	2.1	1.6
29	1.8	1.9	1.8	2.0	1.4	1.4	2.9	4.1	2.8	2.9	2.2	1.1	1.0	1.3	2.4	3.3	3.2	3.5	3.5	2.4	1.7	1.9	2.7	2.6	2.3
30	2.0	2.1	2.1	2.0	1.7	1.5	1.7	2.6	3.5	3.9	3.5	3.2	3.5	3.7	3.3	3.1	3.1	3.1	3.1	2.8	2.1	1.0	1.0	1.8	2.6
31	1.5	1.7	1.9	1.2	1.0	1.0	1.0	2.1	4.0	3.6	3.2	3.6	3.9	4.0	4.3	4.6	5.2	5.1	4.1	2.4	1.7	1.5	2.8	3.1	2.9
	1.8	1.8	1.6	1.5	1.5	1.6	2.1	2.6	2.6	2.2	1.9	2.0	2.2	2.5	2.4	2.6	2.7	2.5	2.4	2.1	1.9	1.9	2.0	1.9	
	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 744 NUMBER OF MISSING HOURS = 0 DATA CAPTURE = 100.00 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 2.084 MAXIMUM HOURLY VALUE = 7.100MAXIMUM VALUE OCCURED ON DAY 7 , HOUR ENDING 10

TABLE C-5

SOUTH STATION AIR QUALITY STUDY

M TRACKS

CARBON MONOXIDE CONCENTRATION (PPM)

DATA FOR NOVEMBER 1974

HOURS (LST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	AVG
1	2.9	3.3	3.0	2.6	1.8	2.0	2.7	3.6	3.8	3.4	2.9	2.9	3.1	3.1	3.3	4.2	4.9	5.4	4.6	3.3	2.6	2.6	2.6	1.1	3.2
2	1.6	1.5	1.2	1.0	1.0	1.2	1.3	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	2.7	2.5	1.5	1.2
3	1.5	1.2	1.3	1.5	1.5	1.2	1.1	1.0	1.0	1.1	1.5	1.4	1.4	1.4	1.7	2.1	2.2	1.6	1.7	2.0	3.1	5.2	3.9	2.6	1.8
4	2.1	1.8	1.4	1.3	1.4	1.7	2.9	4.2	4.5	3.9	3.8	4.3	4.2	4.3	3.9	5.1	6.5	8.7	6.6	4.1	3.3	3.2	2.4	1.3	3.6
5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.9	1.1
6	5.7	5.6	4.9	4.5	4.3	4.5	4.4	4.6	5.2	5.3	4.8	4.4	4.1	3.6	3.8	4.5	5.2	5.5	5.1	5.1	4.6	3.7	3.0	2.8	4.5
7	2.0	1.6	1.0	1.2	1.0	1.1	1.3	1.8	2.5	2.8	2.6	2.5	1.9	1.6	1.6	1.9	2.2	2.4	2.0	1.3	1.0	1.0	1.0	1.0	1.7
8	1.0	1.1	1.3	1.0	1.4	1.5	1.4	1.4	1.5	1.5	1.2	1.0	1.2	1.0	1.4	3.3	3.7	3.2	2.2	1.6	1.4	1.7	1.7	1.7	1.7
9	1.2	1.2	1.2	1.2	1.1	1.1	1.3	1.6	1.9	1.8	1.4	1.2	1.2	1.2	1.2	1.3	1.7	1.9	1.9	2.0	1.9	1.6	1.8	1.7	1.5
10	1.2	1.3	1.6	1.8	2.0	2.1	1.6	1.5	1.1	1.0	1.1	1.1	1.2	1.3	1.2	1.0	1.0	1.0	1.1	1.6	2.9	4.2	8.0	5.6	2.0
11	5.7	2.5	3.0	2.3	2.9	2.8	4.4	6.3	7.9	3.1	1.0	1.6	1.7	1.9	1.9	2.1	1.9	1.8	1.4	1.5	1.4	1.2	1.2	1.3	2.6
12	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.2	1.6	1.7	1.7	1.9	2.1	2.3	2.3	2.1	2.0	2.0	2.2	2.0	1.5
13	1.0	1.0	1.0	1.0	1.0	1.2	1.7	1.9	2.0	1.6	1.8	1.8	1.6	1.8	2.0	2.2	2.6	3.0	2.9	2.6	2.0	2.0	2.0	1.9	1.8
14	1.0	1.4	2.3	2.3	2.5	2.8	3.4	4.6	4.7	3.6	2.2	1.2	1.1	1.6	1.7	1.9	2.3	2.5	2.8	2.9	2.7	2.4	2.0	1.8	2.4
15	1.1	1.3	1.4	1.7	1.5	1.4	1.6	2.0	1.7	1.3	1.1	1.1	1.7	2.4	2.7	3.0	3.5	3.8	3.2	3.0	2.7	2.4	2.5	2.3	2.1
16	1.4	1.2	1.7	1.7	1.5	1.1	1.0	1.1	1.3	1.6	1.9	2.3	1.7	1.2	1.1	1.0	1.1	1.3	1.4	1.6	1.8	1.6	1.2	1.0	1.4
17	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.7	2.0	2.5	2.8	2.2	1.9	1.6	1.0	1.3
18	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.2	1.0	1.0	1.0	1.0	1.0	1.0	4.2	5.5	6.3	5.0	4.2	4.8	5.2	4.6	4.6	2.5
19	3.4	3.2	3.0	2.5	2.5	2.4	2.9	4.6	6.6	7.2	4.8	3.0	2.0	3.2	3.7	5.4	6.1	6.7	5.2	5.4	4.8	5.4	10.2	11.8	4.9
20	14.3	10.7	6.3	6.5	5.3	5.2	4.2	3.9	4.3	4.3	3.7	3.2	3.2	2.7	2.2	2.2	2.3	2.9	3.2	3.0	4.1	4.9	6.8	7.5	5.0
21	4.6	3.4	3.1	3.0	3.1	3.1	3.0	4.8	5.3	4.9	4.4	4.5	4.9	3.7	2.7	3.4	4.5	4.1	3.2	2.8	2.8	2.8	2.0	1.5	3.6
22	2.0	2.3	2.4	1.9	2.2	2.1	2.4	3.2	4.1	4.0	3.8	3.8	3.1	2.0	2.2	2.3	2.9	3.3	1.9	1.8	2.3	2.6	2.3	2.1	2.6
23	2.3	2.3	2.3	2.1	2.2	2.9	3.5	3.9	4.1	4.4	5.5	5.4	3.7	3.2	3.2	2.8	2.6	3.8	3.7	3.9	4.3	4.4	3.6	3.4	3.5
24	3.1	3.1	3.1	3.0	2.6	2.6	3.2	3.4	3.8	3.7	3.3	3.5	3.6	4.0	4.6	4.8	4.7	4.1	3.1	2.9	3.2	4.0	3.5	3.3	3.5
25	2.9	2.3	2.8	3.3	3.4	3.6	4.5	7.0	8.4	6.0	5.3	2.0	2.2	2.7	2.7	3.0	3.2	2.6	2.3	1.6	1.3	1.6	1.3	1.3	3.2
26	1.5	1.4	1.4	1.4	1.6	2.4	3.0	2.7	2.8	3.0	3.1	3.0	3.0	2.7	2.5	2.7	3.0	3.2	3.4	3.8	4.1	4.5	4.4	3.9	2.9
27	3.7	3.3	3.1	3.5	3.7	3.7	4.2	5.8	7.2	6.6	5.6	4.9	3.8	3.5	3.6	4.2	5.3	5.8	5.4	4.7	4.0	3.3	3.1	2.9	4.4
28	2.4	2.3	2.3	2.0	2.0	1.3	1.5	1.7	1.9	2.5	2.8	2.9	2.8	2.0	1.9	1.8	1.7	2.1	3.6	5.1	5.7	6.5	3.2	3.7	2.8
29	4.1	3.6	3.2	2.9	2.6	2.5	2.5	2.5	2.3	2.4	2.4	2.7	2.9	3.1	3.4	3.6	3.6	3.7	3.8	3.8	3.9	4.0	3.6	3.2	3.2
30	3.0	3.1	2.5	2.1	2.2	2.6	3.0	3.4	3.5	3.4	3.4	3.3	2.9	2.3	1.8	1.9	2.1	2.1	2.5	2.9	2.8	2.7	3.5	5.0	2.9
	2.7	2.4	2.3	2.1	2.1	2.1	2.4	2.9	3.3	3.0	2.7	2.5	2.4	2.3	2.3	2.7	3.1	3.3	3.0	2.9	2.9	3.1	3.1	2.9	
	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	

TOTAL HOURS = 720 NUMBER OF GOOD HOURS = 720 NUMBER OF MISSING HOURS = 0 DATA CAPTURE = 100.00 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 2.680 MAXIMUM HOURLY VALUE = 14.300MAXIMUM VALUE OCCURED ON DAY 20 , HOUR ENDING 1

TABLE C-6

SOUTH STATION AIR QUALITY STUDY

M TRACKS CARBON MONOXIDE CONCENTRATION (PPM) DATA FOR DECEMBER 1974

DAY	HOURS (LST)																								AVG
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	5.9	4.5	4.3	4.1	4.1	3.9	3.2	2.7	2.7	2.8	2.7	2.8	2.7	2.3	2.2	2.3	2.5	2.5	2.6	2.6	2.5	2.2	1.8	1.5	3.0
2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.6	2.6	3.2	4.8	6.8	6.6	5.1	3.2	2.6	2.0	2.2	2.4	2.3
3	1.9	1.8	1.8	1.4	1.0	1.2	1.9	2.9	3.3	2.7	2.0	1.9	1.6	1.9	2.4	2.8	3.6	3.6	3.0	2.2	2.0	2.1	1.9	1.5	2.2
4	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.2	1.7	1.9	2.0	2.2	2.1	2.1	2.4	2.5	2.7	2.7	2.7	2.5	2.4	2.5	2.4	2.3	1.9
5	1.3	1.0	1.1	1.2	1.0	1.2	2.3	3.2	3.8	3.8	3.1	2.3	1.8	1.7	2.0	2.6	3.8	5.0	4.7	4.0	4.1	3.5	3.7	4.6	2.8
6	3.6	2.7	2.9	2.8	2.0	1.7	2.7	4.6	4.8	4.3	2.6	1.2	1.0	1.0	1.7	2.8	4.6	5.7	4.3	1.9	2.5	4.6	6.6	4.4	3.2
7	5.5	5.4	5.2	4.8	4.3	4.7	5.8	6.1	4.3	3.1	1.8	1.3	1.0	1.0	1.0	1.0	1.0	1.0	4.9	6.2	5.2	3.7	4.5	6.4	3.7
8	3.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1
9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.3	2.1	2.0	1.9	1.6	1.1	1.0	2.7	2.4	4.0	4.2	2.7	2.4	2.4	2.6	2.6	2.0
10	2.7	2.5	1.5	1.0	1.0	1.4	2.3	1.8	1.5	1.8	2.4	2.7	3.0	3.0	3.3	3.8	4.3	4.7	4.8	4.6	4.8	5.2	4.5	3.4	3.0
11	1.0	1.0	1.0	1.0	1.0	1.0	2.7	4.8	6.3	6.2	6.0	6.1	5.9	5.8	5.7	5.6	5.7	6.0	6.9	7.0	6.3	5.4	5.2	4.5	4.5
12	3.9	3.3	3.1	2.5	2.3	3.8	3.5	5.3	5.3	4.1	3.0	2.7	2.8	3.6	4.3	5.9	8.9	5.7	5.1	5.3	5.3	4.9	4.7	5.2	4.4
13	2.6	2.9	2.9	2.9	3.5	3.2	3.1	3.8	6.9	4.6	3.0	2.2	2.4	3.0	2.3	2.4	3.3	4.6	5.7	5.7	4.2	2.8	3.0	3.6	3.5
14	2.2	2.0	1.6	1.9	2.0	2.7	2.4	1.5	1.3	1.9	2.1	2.2	2.6	2.7	2.4	2.0	2.0	2.2	2.6	2.9	2.8	1.9	1.0	1.5	2.1
15	1.4	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.6	2.0	1.7	1.0	1.0	1.2	1.1	1.0	1.6	1.9	1.9	1.2
16	1.3	1.7	1.2	1.1	1.4	1.1	1.0	1.7	2.4	1.2	1.0	1.0	1.0	1.0	1.2	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.2
17	1.0	1.0	1.0	1.0	1.0	1.4	1.4	2.4	3.4	2.6	2.1	1.9	2.0	1.4	1.8	2.8	4.2	4.1	4.1	3.6	3.2	2.9	2.6	2.1	2.3
18	2.1	1.8	1.8	1.5	1.4	1.2	1.4	2.1	2.5	1.8	1.0	1.0	2.3	1.7	1.9	3.1	4.2	4.4	2.9	1.9	2.1	2.3	2.4	2.1	2.1
19	1.5	1.5	1.4	1.2	1.0	1.2	1.8	3.0	4.0	3.6	2.5	2.9	3.0	2.3	2.3	2.9	4.3	3.9	2.8	2.5	2.2	2.7	2.8	2.5	2.5
20	1.8	1.3	1.6	1.4	1.6	1.6	2.3	4.1	4.6	4.0	3.5	3.2	1.9	1.6	1.7	1.9	2.3	2.1	1.9	2.1	2.4	2.4	2.6	2.0	2.3
21	1.7	1.2	1.3	1.5	1.3	1.0	1.2	1.8	1.2	1.0	1.3	1.4	1.8	2.2	1.4	1.5	1.3	1.4	1.0	1.0	2.4	3.2	2.0	2.2	1.6
22	1.8	1.7	1.6	1.4	1.1	1.4	1.1	1.4	1.1	1.0	1.3	1.2	1.7	1.2	1.0	1.2	2.0	1.8	2.4	2.6	3.1	3.0	3.0	3.0	1.8
23	2.4	2.2	1.6	1.6	1.5	1.7	2.9	3.9	4.5	5.0	4.3	3.0	3.1	2.6	2.6	3.5	4.8	5.3	4.2	3.4	2.9	2.6	2.6	3.0	3.1
24	2.5	1.5	1.7	1.7	1.3	1.3	2.1	3.3	3.9	4.3	4.1	3.6	3.2	4.3	4.1	5.1	4.6	4.9	4.0	3.9	4.0	3.8	3.3	3.5	3.3
25	1.5	3.4	2.5	1.7	1.4	1.3	1.1	1.2	1.3	1.0	1.0	1.4	2.1	2.3	2.0	2.0	1.8	1.4	1.3	1.5	1.1	1.1	1.4	1.4	1.7
26	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	2.3	2.5	2.5	2.0	1.7	1.4	1.6	2.3	3.4	4.5	3.5	3.3	3.2	3.7	3.0	3.5	2.2
27	1.9	2.5	2.1	1.6	1.7	2.3	3.2	4.5	5.3	4.0	3.0	3.2	3.2	3.3	4.1	4.3	5.2	5.2	4.6	3.5	2.6	2.8	2.8	2.7	3.4
28	2.6	3.2	2.8	2.9	2.5	2.2	1.7	1.6	1.8	1.6	2.1	1.4	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.7	1.9	2.2	1.9	1.8
29	1.7	1.6	1.2	1.4	1.8	1.4	1.4	1.0	1.3	1.4	1.3	1.3	1.9	2.3	2.4	3.3	2.8	3.0	2.9	3.2	3.2	2.8	2.4	2.8	2.1
30	1.6	3.6	2.0	3.3	3.3	3.7	3.0	2.7	2.3	2.8	3.2	2.6	1.7	1.7	1.8	1.2	1.1	1.0	1.0	1.1	1.5	1.3	1.1	1.3	2.1
31	1.2	1.4	1.7	1.6	1.3	1.1	1.4	1.2	1.6	1.5	1.1	1.5	1.7	1.9	2.3	2.0	2.1	1.6	2.0	2.1	1.0	1.2	1.3	1.5	1.6
	2.3	2.0	1.8	1.8	1.7	1.8	2.0	2.6	2.9	2.6	2.3	2.1	2.1	2.1	2.3	2.7	3.2	3.3	3.2	2.9	2.8	2.7	2.7	2.7	
	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 744 NUMBER OF MISSING HOURS = 0 DATA CAPTURE = 100.00 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 2.446 MAXIMUM HOURLY VALUE = 8.900MAXIMUM VALUE OCCURED ON DAY 12 , HOUR ENDING 17

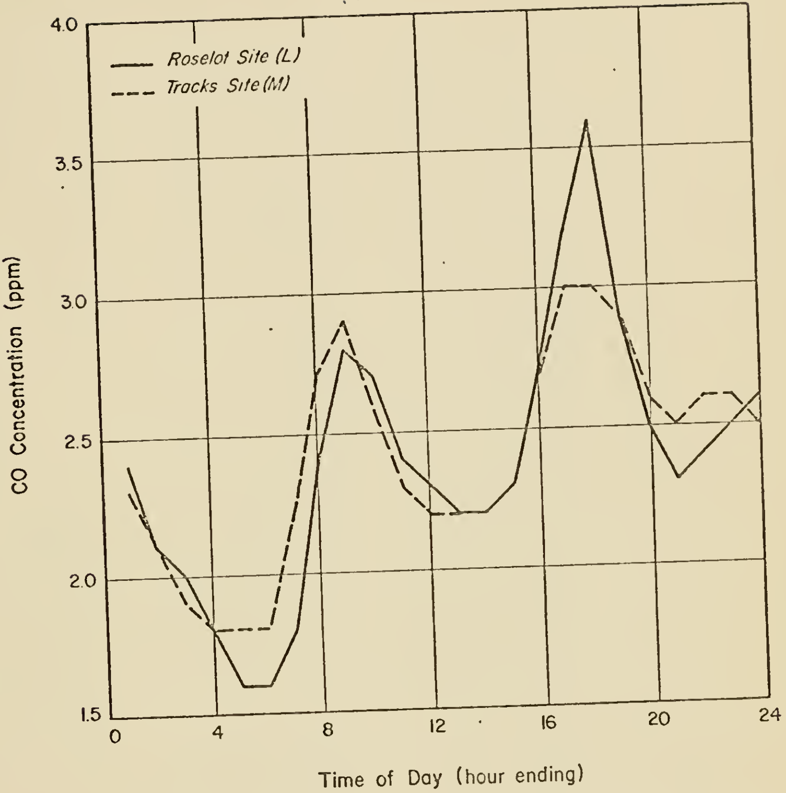


Figure C-3 Carbon Monoxide Concentration Versus Time of Day

TABLE C-7

SOUTH STATION AIR QUALITY STUDY

8 HOUR RUNNING AVERAGES

L RUSELOT CARBON MONOXIDE CONCENTRATION (PPM) DATA FOR OCTOBER 1974

DAY	HOURS (LST)																							
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	99.9	99.9	99.9	2.7	2.9	3.0	3.1	3.2	3.4	3.7	3.9	4.0	3.9	3.8	3.7	3.5	3.4	3.2	3.0	2.9	2.9	2.8	2.8	2.8
2	2.9	3.0	3.0	3.0	2.9	2.9	2.9	3.0	3.0	3.2	3.3	3.4	3.6	3.8	3.9	4.0	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.1
3	3.9	3.6	3.4	3.3	3.2	3.0	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.2	3.6	3.8	3.9	4.0	4.0	4.0	4.0
4	3.8	3.5	3.2	3.1	3.0	3.0	2.9	2.9	2.8	2.9	2.9	2.9	3.0	2.9	2.9	2.7	2.7	2.7	2.7	2.8	2.7	2.7	2.8	2.8
5	2.8	2.6	2.4	2.2	2.0	1.8	1.7	1.5	1.4	1.3	1.3	1.3	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.2	2.3
6	2.5	2.6	2.6	2.7	2.6	2.5	2.4	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.6	2.8	2.6	2.8
7	2.8	2.7	2.5	2.3	2.2	2.1	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.0	1.9	1.5
8	1.6	1.4	1.3	1.2	1.1	1.1	1.1	1.3	1.6	2.0	2.2	2.3	2.4	2.5	2.6	2.5	2.4	2.2	2.0	1.8	1.7	1.7	1.9	2.2
9	2.3	2.4	2.5	2.6	2.7	2.7	2.5	2.4	2.5	2.7	2.7	2.7	2.6	2.6	2.5	2.2	1.8	1.4	1.1	1.1	1.0	1.0	1.2	1.3
10	1.6	1.8	2.1	2.4	2.6	2.8	3.0	3.2	3.3	3.4	3.4	3.5	3.5	3.5	3.4	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.5
11	2.3	2.1	1.8	1.6	1.5	1.4	1.2	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.2	2.5	2.6	2.7	2.7	2.7	2.8	2.8	2.9	2.9
12	2.8	2.8	2.9	3.0	3.0	2.9	2.8	2.6	2.4	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1
13	2.3	2.4	2.4	2.4	2.3	2.1	2.0	1.8	1.5	1.3	1.3	1.3	1.4	1.5	1.6	1.6	1.6	1.6	1.5	1.4	1.2	1.2	1.1	1.3
14	1.4	1.7	1.9	2.2	2.4	2.5	2.6	2.6	2.6	2.5	2.3	2.1	1.9	1.7	1.6	1.5	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.1
5	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.4	1.7	2.1	2.5	2.7	3.0	3.4	3.7	3.8	3.9	4.0	3.9	3.7	3.4	3.1	2.8	2.5
6	2.2	1.8	1.6	1.7	1.8	1.9	2.0	2.2	2.4	2.5	2.6	2.6	2.7	2.8	2.7	2.5	2.6	3.0	3.3	3.5	3.5	3.5	3.5	3.4
7	3.1	2.6	2.2	1.9	1.6	1.5	1.4	1.6	1.8	2.2	2.5	2.8	2.6	2.9	3.1	3.2	3.0	99.9	99.9	99.9	99.9	99.9	99.9	99.9
8	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	99.9	2.6	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.5	2.3
9	2.3	2.3	2.3	2.1	2.0	1.9	1.9	1.9	1.7	1.6	1.6	1.6	1.7	1.6	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1
20	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.4	1.3	1.3	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
21	1.6	1.6	1.6	1.7	1.7	1.8	2.0	2.3	2.5	2.8	2.6	2.7	2.7	2.7	2.7	2.7	2.9	3.0	3.1	3.1	3.2	3.4	3.6	3.5
22	3.2	3.1	3.0	2.8	2.7	2.4	2.3	2.4	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.2
23	2.1	2.0	1.9	1.7	1.6	1.6	1.7	1.9	2.3	2.5	2.6	2.6	2.7	2.7	2.8	2.9	3.1	3.4	3.7	3.8	3.9	3.9	3.7	3.2
24	2.6	2.1	1.8	1.6	1.5	1.5	1.4	1.6	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.6	2.8	2.8	2.7	2.7	2.5
25	2.2	1.8	1.7	1.6	1.6	1.6	1.5	1.3	1.3	1.3	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.1	1.0	1.0	1.0	1.0
26	1.6	2.0	2.2	2.2	2.0	1.8	1.7	1.6	1.3	1.2	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.5	2.6	2.6	2.6	2.6	2.5
27	2.4	2.3	2.2	2.0	1.9	1.8	1.6	1.6	1.5	1.3	1.2	1.1	1.1	1.0	1.0	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.7
28	1.7	1.6	1.5	1.5	1.4	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	2.7	2.7	2.8
29	2.8	2.9	2.8	2.8	2.7	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.5	2.6	2.6	2.6	2.6	2.8	2.9	2.6	2.7	2.7	2.7	2.6
30	2.4	2.2	2.1	2.0	2.0	1.9	1.9	2.0	2.3	2.8	3.1	3.5	3.8	4.2	4.6	4.9	5.0	5.1	5.1	5.0	4.8	4.4	4.1	3.7
31	3.5	3.3	3.1	2.9	2.8	2.8	2.9	3.0	3.1	2.9	2.9	3.0	3.1	3.1	3.0	3.0	3.1	3.2	3.4	3.4	3.3	3.2	3.1	2.9

NO 8-HOUR RUNNING VALUES EXCEED 90.000 ,MAXIMUM 8-HOUR RUNNING AVERAGE IS 5.125

NOTE : 999 - MISSING VALUE INDICATOR

TABLE C-8

SOUTH STATION AIR QUALITY STUDY

8 HOUR RUNNING AVERAGES

L ROSELOT CARBON MONOXIDE CONCENTRATION (PPM) DATA FOR NOVEMBER 1974

DAY HOURS (LST)

HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	99.9	99.9	99.9	2.6	2.4	2.5	2.3	2.4	2.6	2.6	2.6	2.6	2.8	3.0	3.1	3.3	3.5	3.9	4.2	4.4	4.5	4.5	4.5	4.2
2	3.8	3.1	2.6	2.2	1.9	1.5	1.3	1.1	1.1	1.1	1.1	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.5	1.6	1.6
3	1.7	1.6	1.6	1.6	1.7	1.6	1.5	1.5	1.4	1.3	1.3	1.2	1.1	1.1	1.1	1.2	1.3	1.5	1.6	1.8	2.1	2.6	3.0	3.1
4	3.1	3.1	2.9	2.8	2.4	1.9	1.5	1.3	1.3	1.3	1.4	1.6	1.7	1.8	2.0	2.5	3.3	4.3	4.7	5.0	5.2	5.6	5.7	5.5
5	4.6	3.7	3.2	2.8	2.6	2.1	1.8	1.9	2.2	2.6	2.8	3.0	3.1	3.2	3.2	3.2	2.9	2.7	2.7	2.6	2.6	2.6	2.6	2.5
6	2.3	2.0	1.8	1.6	1.4	1.3	1.2	1.1	1.2	1.5	1.9	2.2	2.4	2.5	2.7	2.8	2.9	3.1	3.4	3.8	4.2	4.4	4.4	4.5
7	4.6	4.3	3.8	3.1	2.5	2.2	2.0	1.9	1.9	2.1	2.3	2.6	2.9	3.3	3.6	3.9	4.3	4.7	4.8	4.7	4.6	4.5	4.3	4.0
8	3.3	2.7	2.4	2.3	2.2	2.2	2.4	2.8	3.2	3.7	4.0	4.3	4.5	4.7	4.6	4.6	4.6	4.4	4.1	3.7	3.3	2.9	2.6	2.2
9	1.7	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.2	1.2	1.4	1.5	1.5	1.8	2.2	2.6	3.0	3.2	3.3	3.4	3.5	3.5
10	3.2	2.9	2.6	2.5	2.4	2.3	2.2	2.0	1.8	1.7	1.5	1.4	1.2	1.1	1.0	1.0	1.0	1.1	1.3	1.4	1.5	1.8	2.3	2.7
11	3.0	3.2	3.3	3.4	3.5	3.3	3.1	3.3	3.7	4.1	4.0	4.0	3.9	3.8	3.6	3.2	2.6	2.3	2.4	2.2	2.1	2.0	2.0	2.0
12	1.8	1.6	1.3	1.4	1.4	1.5	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.3	1.3	1.4	1.5	1.7	1.9	2.0	2.0	2.0	2.0	2.0
13	2.0	1.8	1.6	1.5	1.4	1.5	1.5	1.5	1.6	1.8	2.0	2.2	2.4	2.6	2.7	2.9	3.1	3.3	3.4	3.5	3.4	3.3	3.1	2.9
14	2.7	2.3	2.0	1.8	1.7	1.7	1.8	2.0	2.4	2.7	2.8	2.7	2.6	2.5	2.5	2.2	1.8	1.5	1.5	1.5	1.6	1.6	1.5	1.5
15	1.5	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.5	2.9	3.1	3.1	3.2	3.3	3.4	3.4
16	3.2	2.8	2.6	2.5	2.4	2.2	2.1	2.0	2.0	2.0	2.1	2.2	2.3	2.4	2.6	2.7	2.8	2.9	3.0	3.0	3.1	3.1	3.2	3.3
17	3.3	3.2	3.2	3.1	3.0	2.8	2.5	2.2	2.1	2.1	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.5	2.7	2.9	3.1	3.4	3.5	3.7
18	3.7	3.7	3.6	3.4	3.0	2.6	2.4	2.3	2.4	2.5	2.6	2.6	2.7	2.8	3.0	3.0	2.6	3.2	3.4	3.7	3.9	4.1	4.3	4.5
19	4.6	4.2	4.1	3.8	3.6	3.4	3.2	3.2	3.6	4.0	3.9	3.8	3.7	3.6	3.5	3.3	3.2	3.1	3.3	3.6	3.8	4.1	5.1	6.0
20	6.8	7.1	7.3	7.4	7.4	7.2	6.3	5.5	4.4	3.8	3.3	3.0	2.7	2.5	2.4	2.2	2.0	1.8	1.7	1.6	1.7	2.1	2.5	2.9
21	3.0	3.1	3.1	3.2	3.2	2.6	2.3	1.8	1.7	1.8	1.7	1.7	1.9	2.0	2.1	2.2	2.4	2.6	2.7	2.6	2.4	2.3	2.2	2.0
22	1.7	1.3	1.1	1.0	1.0	1.0	1.0	1.0	1.2	1.4	1.5	1.7	1.9	2.0	2.1	2.5	2.6	2.7	2.7	2.7	2.6	2.6	2.5	2.4
23	2.3	2.0	1.9	1.8	1.8	1.8	1.7	1.7	1.7	1.9	2.1	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.8	2.0	2.2	2.4	2.6	2.8
24	2.9	2.9	3.0	2.9	2.9	2.8	2.6	2.4	2.2	1.9	1.7	1.5	1.4	1.3	1.3	1.2	1.3	1.5	1.6	1.6	1.6	1.7	1.9	2.0
25	2.0	1.9	2.0	2.0	2.0	2.0	1.9	2.1	2.4	2.8	3.1	3.4	3.7	4.0	4.3	4.5	4.7	4.8	4.7	4.4	4.2	3.9	3.5	3.1
26	2.6	2.1	1.9	1.7	1.6	1.6	1.6	1.7	1.6	1.7	1.8	1.9	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.1	1.9	1.8
27	1.6	1.5	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.2	1.7	2.1	2.6	2.9	3.4	4.0	4.7	5.0	4.9	4.6	4.4	4.2	3.8
28	3.3	2.7	2.3	2.0	1.9	1.8	1.8	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.8	2.0	2.4	3.0	3.2	3.4	3.7
29	4.0	4.1	3.9	3.5	3.0	2.8	2.6	2.4	2.3	2.3	2.3	2.4	2.5	2.6	2.7	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	2.9
30	2.8	2.7	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.7	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.6	2.9

NO 8-HOUR RUNNING VALUES EXCEED 90.000 ,MAXIMUM 8-HOUR RUNNING AVERAGE IS 7.413

NOTE : 999 - MISSING VALUE INDICATOR

TABLE C-9

SOUTH STATION AIR QUALITY STUDY

8 HOUR RUNNING AVERAGES

L ROSELOT

CARBON MONOXIDE CONCENTRATION (PPM)

DATA FOR DECEMBER 1974

DAY											HOURS	(LST)												
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	99.9	99.9	99.9	3.6	3.5	3.4	3.4	3.3	3.1	2.9	2.8	2.7	2.6	2.4	2.2	2.0	1.8	1.7	1.5	1.3	1.2	1.2	1.2	1.1
2	1.1	1.2	1.2	1.2	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.7	1.9	2.3	3.0	3.6	4.1	4.3	4.2	3.8	3.6	3.3
3	2.7	2.1	1.7	1.4	1.3	1.3	1.2	1.3	1.4	1.7	1.9	2.1	2.3	2.4	2.6	2.7	2.8	2.9	2.8	2.6	2.5	2.4	2.3	2.0
4	1.6	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.8	2.0	2.4	2.9	3.2	3.4	3.5	3.5	3.3	3.0
5	2.6	2.1	1.7	1.5	1.3	1.2	1.2	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.6	2.1	2.7	3.3	3.6	4.0	4.4	4.7	4.8
6	4.6	4.3	4.1	4.1	4.0	3.9	3.9	4.1	4.5	4.8	5.0	5.1	5.2	5.2	5.0	4.6	4.3	4.0	4.0	4.0	4.1	4.4	5.2	5.7
7	6.2	6.5	6.8	7.0	7.1	6.9	6.7	6.7	6.3	6.0	5.6	5.3	5.0	4.6	4.2	3.7	3.4	3.4	3.8	4.5	5.0	5.5	6.1	7.3
8	7.5	7.2	6.6	5.8	5.2	4.5	3.9	2.7	2.2	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.9	2.1	2.2	2.1	2.1	2.1	2.0	1.9
9	1.8	1.6	1.4	1.3	1.2	1.2	1.3	1.5	1.8	2.0	2.3	2.6	2.6	2.6	2.4	2.1	1.8	1.6	1.2	1.0	1.0	1.0	1.0	1.0
10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
11	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
12	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
13	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.4	1.4
17	1.4	1.4	1.5	1.6	1.7	1.6	1.6	1.9	2.2	2.5	2.7	3.0	3.2	3.5	3.7	4.0	4.2	4.6	4.8	4.9	4.9	4.9	4.7	4.4
18	4.0	3.3	2.9	2.6	2.4	2.2	2.0	2.1	2.3	2.5	2.6	2.8	3.0	3.1	3.2	3.1	3.3	3.5	3.5	3.5	3.5	3.4	3.4	3.3
19	2.8	2.5	2.3	2.1	1.9	1.8	1.8	1.9	2.3	2.6	2.7	2.9	3.1	3.2	3.3	3.2	3.0	3.1	3.1	3.1	3.0	2.9	2.8	2.7
20	2.5	2.3	2.2	2.1	2.0	2.1	2.0	2.1	2.4	2.7	2.8	2.9	3.1	3.2	3.3	3.2	3.0	2.8	2.6	2.4	2.3	2.3	2.3	2.3
21	2.3	2.1	2.1	2.2	2.2	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.9	2.1	2.2	2.2	2.1	2.1	2.1	2.2	2.4	2.5	2.6
22	2.7	2.8	2.8	2.8	2.5	2.0	1.6	1.5	1.4	1.3	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.0	2.1	2.2	2.2	2.2
23	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.5	3.0	3.5	3.8	4.0	4.3	4.5	4.8	4.8	4.7	4.6	4.4	4.2	4.0	3.8	3.6	3.5
24	3.2	2.9	2.7	2.5	2.4	2.3	2.1	2.1	2.2	2.3	2.5	2.7	3.0	3.3	3.5	3.6	3.6	3.6	3.6	3.6	3.5	3.4	3.3	3.1
25	2.8	2.6	2.5	2.4	2.2	1.9	1.7	1.6	1.6	1.5	1.4	1.4	1.6	1.8	1.8	1.8	1.7	1.7	1.9	2.0	2.0	1.9	2.0	2.1
26	2.1	2.1	2.0	1.6	1.7	1.7	1.7	1.9	2.1	2.4	2.5	2.7	2.9	3.1	3.1	3.2	3.4	3.8	3.9	3.9	3.8	3.7	3.8	3.8
27	3.5	3.0	2.8	2.7	2.6	2.6	2.5	2.7	2.9	3.0	3.2	3.2	3.4	3.6	3.7	3.7	3.8	4.0	4.0	4.1	4.1	4.0	3.8	3.6
28	3.2	2.8	1.7	2.4	2.2	2.0	1.9	1.7	1.6	1.6	1.7	1.7	1.7	1.8	1.9	2.0	2.2	2.3	2.4	2.5	2.6	2.7	3.0	3.2
29	3.4	3.4	3.6	3.5	3.6	3.5	3.2	2.8	2.5	2.3	1.9	1.7	1.6	1.6	1.6	1.6	1.7	1.8	1.9	1.9	2.0	2.0	2.0	1.9
30	1.8	1.7	1.6	1.6	1.5	1.4	1.5	1.6	1.9	2.1	2.4	2.8	3.1	3.2	3.2	3.2	3.4	3.5	3.4	3.1	2.9	2.8	2.7	2.6
31	2.3	1.9	1.7	1.6	1.5	1.4	1.3	1.3	1.6	1.9	2.0	2.2	2.3	2.5	2.6	2.6	2.3	2.1	2.0	1.9	1.7	1.6	1.6	1.5

NO 8-HOUR RUNNING VALUES EXCEED 90.000 ,MAXIMUM 8-HOUR RUNNING AVERAGE IS 7.525

NOTE : 999 - MISSING VALUE INDICATOR

TABLE C-10

SOUTH STATION AIR QUALITY STUDY

8 HOUR RUNNING AVERAGES

M TRACKS　　　CARBON MONOXIDE CONCENTRATION (PPM)　　　DATA FOR OCTOBER 1974

DAY　　　HOURS (LST)

HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	99.9	99.9	99.9	1.0	1.0	1.0	1.0	1.1	1.3	1.5	1.6	1.8	1.9	2.0	2.0	2.0	1.9	1.9	1.8	1.7	1.6	1.5	1.4	1.4
2	1.3	1.4	1.5	1.6	1.8	1.9	2.0	2.2	2.3	2.5	2.4	2.5	2.4	2.5	2.6	2.7	2.7	2.7	2.7	2.5	2.4	2.2	1.9	1.7
3	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.2	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.2	1.3	1.5	1.5	1.6	1.7	1.7	1.8
4	1.8	1.7	1.6	1.7	1.8	1.9	2.1	2.2	2.4	2.4	2.4	2.3	2.2	2.1	2.2	2.2	2.2	2.3	2.4	2.6	2.8	2.9	2.9	2.9
5	2.9	2.9	2.8	2.6	2.5	2.3	2.1	1.9	1.7	1.4	1.3	1.3	1.3	1.4	1.6	1.8	2.0	2.2	2.4	2.7	2.9	3.0	2.9	2.8
6	2.7	2.6	2.4	2.1	1.9	1.6	1.7	1.7	1.7	1.8	1.9	2.1	2.3	2.6	2.8	3.1	3.3	3.6	3.9	4.1	4.0	3.9	3.7	3.5
7	3.2	2.9	2.4	2.0	1.8	1.7	1.6	1.9	2.4	3.1	3.6	4.5	5.2	5.7	6.2	6.5	6.5	6.2	5.9	5.5	4.9	4.4	3.8	3.2
8	2.6	2.1	1.7	1.5	1.3	1.3	1.5	1.8	2.0	2.1	2.2	2.3	2.3	2.2	1.9	1.5	1.4	1.3	1.3	1.3	1.4	1.7	2.3	2.7
9	3.1	3.3	3.3	3.3	3.2	3.1	2.9	2.9	2.8	2.6	2.5	2.4	2.3	2.1	1.7	1.3	1.0	1.0	1.0	1.0	1.1	1.1	1.3	1.3
10	1.4	1.4	1.5	1.6	1.6	1.8	2.1	2.5	2.7	2.7	2.8	3.0	3.1	3.2	3.0	2.7	2.7	2.8	2.8	2.6	2.4	2.2	2.1	1.9
11	1.7	1.5	1.4	1.3	1.4	1.4	1.6	1.9	2.1	2.2	2.4	2.9	3.4	3.7	3.8	3.9	4.0	4.2	4.1	3.8	3.5	3.3	3.2	3.0
12	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.7	2.8	2.9	2.9	2.9
13	3.0	3.1	3.1	2.9	2.7	2.5	2.3	2.0	1.6	1.3	1.2	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.4
14	1.6	1.8	2.0	2.2	2.3	2.5	2.7	2.8	2.8	2.7	2.5	2.2	2.0	1.8	1.7	1.4	1.2	1.1	1.1	1.1	1.2	1.4	1.4	1.4
15	1.4	1.4	1.4	1.4	1.3	1.2	1.3	1.6	1.9	2.1	2.3	2.6	2.8	3.1	3.1	3.1	3.2	3.2	3.1	3.0	2.8	2.5	2.2	1.9
16	1.5	1.3	1.2	1.1	1.1	1.0	1.1	1.1	1.2	1.1	1.1	1.1	1.3	1.7	2.0	2.3	2.7	3.0	3.4	3.7	3.7	3.6	3.4	3.0
17	2.6	2.2	1.9	1.6	1.4	1.2	1.1	1.3	1.5	1.7	1.7	1.7	1.9	2.1	2.1	2.0	1.8	1.6	1.7	1.8	1.8	1.9	2.0	2.1
18	2.2	2.2	2.2	2.1	1.9	1.7	1.5	1.3	1.3	1.2	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.4	1.3	1.3	1.3	1.2
19	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.7	1.6	1.5	1.4	1.3	1.1	1.1	1.0	1.0	1.1	1.1
20	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
21	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.4	1.4	1.4	1.6	1.7	1.9	2.1	2.3	2.6	2.8	2.9
22	2.9	2.8	2.7	2.6	2.4	2.2	2.2	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.4	2.7	3.0	3.1	3.2	3.2	3.2	2.9
23	2.5	2.2	2.1	2.2	2.1	2.2	2.3	2.8	3.5	3.9	3.6	3.8	3.9	4.0	3.9	3.6	3.3	3.2	3.3	3.4	3.3	3.2	2.9	2.6
24	2.1	1.8	1.5	1.2	1.1	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.1	2.1	2.1	2.1	2.1	2.1
25	2.1	2.0	1.9	2.0	2.1	2.2	2.4	2.6	2.8	2.9	2.9	2.9	2.9	2.8	2.9	3.0	3.1	3.2	3.2	3.2	3.1	3.0	2.7	2.3
26	2.1	2.0	1.9	1.9	2.0	2.0	1.9	1.9	1.8	1.6	1.4	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0
27	1.1	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1
28	1.1	1.1	1.1	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.6	1.6	1.6	1.5	1.4	1.3	1.4	1.4	1.6	1.7	1.9	2.0	2.1
29	2.1	2.1	2.1	2.1	2.0	1.8	1.9	2.2	2.3	2.4	2.5	2.4	2.3	2.3	2.2	2.1	2.2	2.3	2.4	2.6	2.7	2.7	2.8	2.7
30	2.5	2.4	2.2	2.1	2.1	2.1	2.0	2.0	2.2	2.4	2.6	2.7	2.9	3.2	3.4	3.5	3.4	3.3	3.3	3.2	3.0	2.7	2.4	2.3
31	2.1	1.9	1.7	1.5	1.4	1.4	1.4	1.4	1.7	2.0	2.1	2.4	2.8	3.2	3.6	3.9	4.1	4.2	4.4	4.2	3.9	3.6	3.4	3.2

NO 8-HOUR RUNNING VALUES EXCEED 90.000 ,MAXIMUM 8-HOUR RUNNING AVERAGE IS 6.500

NOTE : 999 - MISSING VALUE INDICATOR

TABLE C-11

SOUTH STATION AIR QUALITY STUDY

8 HOUR RUNNING AVERAGES

M TRACKS

CARBON MONOXIDE CONCENTRATION (PPM)

DATA FOR NOVEMBER 1974

DAY											HOURS	(LST)												
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	99.9	99.9	99.9	3.0	2.7	2.6	2.6	2.7	2.9	2.9	2.9	2.9	3.1	3.2	3.3	3.3	3.5	3.7	3.9	4.0	3.9	3.9	3.8	3.4
2	3.0	2.5	2.1	1.8	1.6	1.4	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.4	1.5
3	1.6	1.6	1.6	1.7	1.7	1.5	1.4	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.5	1.6	1.7	1.7	1.8	2.0	2.5	2.7	2.8
4	2.8	2.8	2.8	2.7	2.5	2.0	1.9	2.1	2.4	2.7	3.0	3.3	3.7	4.0	4.1	4.3	4.5	5.1	5.5	5.4	5.3	5.2	5.0	4.5
5	3.8	2.9	2.2	1.8	1.5	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.2
6	1.8	2.4	2.9	3.3	3.7	4.2	4.6	4.8	4.8	4.7	4.7	4.7	4.7	4.6	4.5	4.5	4.5	4.5	4.5	4.6	4.7	4.7	4.6	4.4
7	4.0	3.5	3.0	2.5	2.1	1.8	1.6	1.4	1.4	1.6	1.8	2.0	2.1	2.2	2.2	2.2	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5
8	1.3	1.2	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.3	1.3	1.3	1.6	1.8	2.1	2.2	2.3	2.3	2.3	2.4	2.2
9	1.8	1.6	1.5	1.4	1.4	1.3	1.3	1.2	1.3	1.4	1.4	1.4	1.4	1.5	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.7	1.8	1.8
10	1.8	1.7	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.6	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.1	1.1	1.2	1.4	1.8	2.6	3.2
11	3.8	4.0	4.2	4.3	4.3	4.1	3.7	3.7	4.0	4.1	3.8	3.8	3.6	3.5	3.2	2.7	1.9	1.7	1.8	1.8	1.7	1.7	1.6	1.5
12	1.4	1.3	1.3	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.7	1.9	2.0	2.0	2.1	2.1	2.1
13	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.2	1.4	1.4	1.5	1.6	1.7	1.8	1.8	1.9	1.9	2.1	2.2	2.3	2.4	2.4	2.4	2.4
14	2.2	2.0	1.9	1.9	1.9	2.0	2.2	2.5	3.0	3.3	3.3	3.1	3.0	2.8	2.6	2.3	2.0	1.8	1.9	2.1	2.3	2.4	2.4	2.4
15	2.3	2.1	2.0	1.8	1.7	1.5	1.5	1.5	1.6	1.6	1.5	1.5	1.5	1.6	1.8	1.9	2.1	2.4	2.7	2.9	3.0	3.0	3.0	2.9
16	2.7	2.3	2.2	2.0	1.8	1.7	1.5	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.3	1.3	1.4	1.4	1.4
17	1.4	1.4	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.5	1.7	1.8	2.0	2.0	2.0
18	1.9	1.8	1.6	1.3	1.2	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.4	2.0	2.6	3.1	3.5	4.0	4.5	5.0	5.0
19	4.8	4.4	4.2	4.0	3.7	3.3	3.1	3.1	3.5	4.0	4.2	4.3	4.3	4.4	4.5	4.6	4.5	4.5	4.5	4.8	5.1	5.3	6.2	7.0
20	8.0	8.5	8.9	9.0	9.1	9.0	8.3	7.3	6.1	5.3	4.7	4.3	4.0	3.7	3.4	3.2	3.0	2.8	2.7	2.7	2.8	3.1	3.7	4.3
21	4.6	4.7	4.7	4.7	4.6	4.3	4.0	3.6	3.7	3.9	4.1	4.2	4.5	4.5	4.4	4.2	4.1	4.0	3.9	3.7	3.4	3.3	3.2	3.0
22	2.7	2.4	2.3	2.2	2.1	2.1	2.1	2.3	2.6	2.8	3.0	3.2	3.3	3.3	3.3	3.2	3.0	2.9	2.7	2.4	2.3	2.4	2.4	2.4
23	2.3	2.2	2.3	2.3	2.3	2.3	2.5	2.7	2.9	3.2	3.6	4.0	4.2	4.2	4.2	4.0	3.9	3.8	3.6	3.4	3.5	3.6	3.7	3.7
24	3.8	3.7	3.6	3.5	3.3	3.1	3.0	3.0	3.1	3.2	3.2	3.3	3.4	3.6	3.7	3.9	4.0	4.1	4.1	4.0	3.9	3.9	3.8	3.6
25	3.4	3.2	3.1	3.2	3.2	3.1	3.3	3.7	4.4	4.9	5.2	5.0	4.9	4.8	4.5	4.0	3.4	3.0	2.6	2.6	2.5	2.3	2.1	1.9
26	1.7	1.5	1.4	1.4	1.4	1.5	1.6	1.9	2.1	2.3	2.5	2.7	2.9	2.9	2.9	2.9	2.9	2.9	2.9	3.0	3.2	3.4	3.6	3.8
27	3.9	3.9	3.8	3.8	3.8	3.7	3.6	3.8	4.3	4.7	5.0	5.2	5.2	5.2	5.1	4.9	4.7	4.6	4.6	4.5	4.6	4.5	4.5	4.5
28	3.9	3.5	3.1	2.8	2.5	2.3	2.1	1.9	1.9	1.9	2.0	2.1	2.2	2.3	2.4	2.4	2.3	2.3	2.4	2.7	3.0	3.5	3.7	3.9
29	4.2	4.4	4.4	4.1	3.7	3.2	3.1	3.0	2.8	2.6	2.5	2.5	2.5	2.6	2.7	2.8	3.0	3.2	3.3	3.5	3.6	3.7	3.7	3.7
30	3.6	3.5	3.4	3.2	3.0	2.8	2.7	2.7	2.8	2.8	2.9	3.1	3.2	3.1	3.0	2.8	2.6	2.5	2.4	2.3	2.3	2.3	2.6	3.0

NO 8-HOUR RUNNING VALUES EXCEED 90.000 ,MAXIMUM 8-HOUR RUNNING AVERAGE IS 9.063

NOTE : 999 - MISSING VALUE INDICATOR

TABLE C-12

SOUTH STATION AIR QUALITY STUDY

8 HOUR RUNNING AVERAGES

M TRA;KS   CARBON MONOXIDE CONCENTRATION (PPM)   DATA FOR DECEMBER 1974

DAY	HOURS (LST)																							
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	99.9	99.9	99.9	4.7	4.6	4.5	4.3	4.1	3.7	3.5	3.3	3.1	2.9	2.7	2.6	2.6	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.3
2	2.1	1.9	1.7	1.5	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.3	1.6	2.0	2.8	3.5	4.0	4.2	4.4	4.3	4.2	3.9
3	3.3	2.7	2.2	2.0	1.8	1.7	1.7	1.7	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.3	2.4	2.5	2.6	2.6	2.7	2.7	2.7	2.5
4	2.2	1.9	1.6	1.5	1.3	1.2	1.1	1.0	1.1	1.2	1.4	1.5	1.6	1.8	2.0	2.1	2.2	2.3	2.4	2.5	2.5	2.6	2.6	2.5
5	2.4	2.1	1.9	1.8	1.6	1.4	1.4	1.5	1.9	2.2	2.5	2.6	2.7	2.8	2.7	2.6	2.6	2.8	3.0	3.2	3.5	3.7	3.9	4.2
6	4.2	3.9	3.6	3.5	3.2	3.0	2.9	2.9	3.0	3.2	3.2	3.0	2.9	2.8	2.7	2.4	2.4	2.6	2.8	2.9	3.1	3.5	4.1	4.3
7	4.4	4.4	4.5	4.9	5.1	5.1	5.0	5.2	5.1	4.6	4.4	3.9	3.5	3.1	2.5	1.8	1.4	1.1	1.5	2.1	2.7	3.0	3.4	4.1
8	4.4	4.4	3.9	3.3	2.7	2.4	2.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.3	1.4	1.6	1.7	1.7	1.8	1.8	1.8	1.9	2.1	2.4	2.5	2.6	2.7	2.9	2.9
10	3.0	2.8	2.4	2.2	2.0	1.9	1.9	1.8	1.6	1.5	1.7	1.9	2.1	2.3	2.4	2.7	3.0	3.4	3.7	3.9	4.2	4.4	4.6	4.5
11	4.1	3.7	3.2	2.7	2.3	1.7	1.5	1.7	2.4	3.0	3.6	4.3	4.9	5.5	5.9	6.0	5.9	5.9	6.0	6.1	6.1	6.1	6.0	5.9
12	5.7	5.3	4.8	4.3	3.8	3.6	3.4	3.5	3.6	3.7	3.7	3.8	3.8	3.8	3.9	4.0	4.4	4.6	4.9	5.2	5.5	5.7	5.7	5.6
13	4.9	4.5	4.2	3.9	3.7	3.5	3.3	3.1	3.7	3.9	3.9	3.8	3.7	3.6	3.5	3.4	2.9	2.9	3.2	3.7	3.9	3.9	4.0	4.1
14	4.0	3.7	3.1	2.7	2.4	2.4	2.3	2.0	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.4	2.2	2.1
15	2.0	1.9	1.7	1.5	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.3	1.4	1.4	1.3	1.3	1.3	1.3
16	1.4	1.5	1.5	1.5	1.5	1.5	1.3	1.3	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
17	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.3	1.6	1.8	1.9	2.0	2.2	2.2	2.2	2.3	2.4	2.5	2.8	3.0	3.2	3.3	3.4	3.4
18	3.1	2.8	2.5	2.3	2.0	1.8	1.7	1.7	1.7	1.7	1.6	1.6	1.7	1.7	1.8	1.9	2.1	2.5	2.7	2.8	2.8	2.9	2.9	2.8
19	2.5	2.1	1.9	1.8	1.7	1.5	1.5	1.6	1.9	2.2	2.3	2.5	2.8	2.9	3.0	2.9	3.0	3.0	3.1	3.0	2.9	3.0	3.0	3.0
20	2.7	2.3	2.2	2.0	2.0	1.8	1.8	2.0	2.3	2.7	2.9	3.1	3.2	3.2	3.1	2.8	2.5	2.3	2.1	1.9	2.0	2.1	2.2	2.2
21	2.2	2.0	2.0	1.9	1.8	1.6	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.7	1.7	1.8
22	1.9	1.9	2.0	2.0	1.9	1.7	1.5	1.4	1.4	1.3	1.2	1.2	1.3	1.3	1.2	1.2	1.3	1.4	1.6	1.8	1.9	2.2	2.4	2.6
23	2.7	2.7	2.6	2.5	2.3	2.1	2.1	2.2	2.5	2.8	3.2	3.4	3.6	3.7	3.6	3.6	3.6	3.7	3.6	3.7	3.7	3.7	3.7	3.6
24	3.3	2.9	2.6	2.4	2.2	2.0	1.9	2.0	2.1	2.5	2.8	3.0	3.2	3.6	3.9	4.1	4.2	4.2	4.2	4.3	4.4	4.3	4.2	4.0
25	3.9	3.7	3.5	3.2	2.9	2.6	2.3	2.0	1.7	1.4	1.3	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.8	1.7	1.5	1.5	1.4
26	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.3	1.4	1.6	1.8	1.8	1.9	2.0	2.0	2.2	2.4	2.6	2.7	2.9	3.2	3.4	3.5
27	3.5	3.2	3.0	2.8	2.6	2.4	2.5	2.6	2.9	3.1	3.2	3.4	3.6	3.7	3.8	3.8	3.8	3.9	4.1	4.2	4.1	4.0	3.9	3.7
28	3.3	3.1	2.9	2.8	2.8	2.7	2.6	2.4	2.3	2.2	2.1	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	1.1	1.2	1.4	1.5
29	1.6	1.6	1.7	1.7	1.7	1.6	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.6	1.9	2.1	2.3	2.5	2.7	2.9	2.9	2.9	2.9
30	2.9	3.0	2.8	2.9	2.9	3.0	3.1	3.0	3.0	2.9	3.0	2.9	2.7	2.5	2.3	2.2	2.0	1.8	1.5	1.3	1.3	1.2	1.2	1.2
31	1.2	1.2	1.3	1.4	1.4	1.3	1.4	1.4	1.4	1.4	1.3	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	1.9	1.8	1.7	1.6

NO 8-HOUR RUNNING VALUES EXCEED 90.000 ,MAXIMUM 8-HOUR RUNNING AVERAGE IS 6.125

NOTE : 999 - MISSING VALUE INDICATOR

TABLE C-13

DIURNAL VARIATION OF MAXIMUM MEASURED CO LEVELS

All Concentrations are in ppm

Time	Roselot Site			Tracks Site		
	Oct	Nov	Dec	Oct	Nov	Dec
00-01	4.0	11.9	8.8	4.2	14.3	5.9
01-02	4.5	8.3	7.3	3.4	10.7	5.4
02-03	3.5	6.9	7.8	2.8	8.3	5.2
03-04	3.2	4.8	6.0	3.2	6.5	4.8
04-05	3.5	3.3	5.6	2.7	5.3	4.3
05-06	3.5	2.7	5.5	3.0	5.2	4.7
06-07	3.6	3.6	5.8	4.7	4.5	5.8
07-08	4.3	5.6	6.5	6.2	7.0	6.1
08-09	5.0	7.8	7.4	6.9	8.4	6.9
09-10	5.3	6.4	6.9	7.1	7.2	6.2
10-11	4.8	4.7	5.6	6.7	5.6	6.0
11-12	4.3	4.6	4.6	6.3	5.4	6.1
12-13	4.3	4.9	4.2	7.0	4.9	5.9
13-14	4.9	4.3	4.5	6.4	4.3	5.8
14-15	5.2	4.3	4.6	6.3	4.6	5.7
15-16	5.5	5.1	5.1	6.2	5.4	5.9
16-17	6.3	8.9	6.6	5.7	6.5	8.9
17-18	6.1	9.2	7.0	5.1	8.7	6.6
18-19	5.2	6.2	7.7	5.1	6.6	6.9
19-20	3.9	6.5	8.5	4.3	5.4	7.0
20-21	3.4	6.2	6.9	3.3	5.7	6.3
21-22	4.4	5.3	7.2	3.9	6.5	5.4
22-23	4.1	9.7	7.6	5.4	10.2	6.6
23-24	4.3	10.1	11.3	4.8	11.8	6.4

TABLE C-14

DIURNAL VARIATION OF MAXIMUM MEASURE RUNNING 8-HOUR CO LEVELS

All Concentrations are in ppm

Time	Roselot Site			Tracks Site		
	Oct	Nov	Dec	Oct	Nov	Dec
00-01	3.9	6.8	7.5	3.2	8.0	5.7
01-02	3.6	7.1	7.2	3.3	8.5	5.3
02-03	3.4	7.3	6.8	3.3	8.9	4.8
03-04	3.3	7.4	7.0	3.3	9.0	4.9
04-05	3.2	7.4	7.1	3.2	9.1	5.1
05-06	3.0	7.2	6.9	3.1	9.0	5.1
06-07	3.1	6.3	6.7	2.9	8.3	5.0
07-08	3.2	5.5	6.7	2.9	7.3	5.2
08-09	3.4	4.4	6.3	3.5	6.1	5.1
09-10	3.7	4.1	6.0	3.9	5.3	4.8
10-11	3.9	4.0	5.6	3.8	5.2	4.4
11-12	4.0	4.3	5.3	4.5	5.2	4.3
12-13	3.9	4.5	5.2	5.2	5.2	4.9
13-14	4.2	4.7	5.2	5.7	5.2	5.5
14-15	4.6	4.6	5.0	6.2	5.1	5.9
15-16	4.9	4.6	4.8	6.5	4.9	6.0
16-17	5.0	4.7	4.7	6.5	4.7	5.9
17-18	5.1	4.8	4.6	6.2	5.1	5.9
18-19	5.1	5.0	4.8	5.9	5.5	6.0
19-20	5.0	5.0	4.9	5.5	5.4	6.1
20-21	4.8	5.2	5.0	4.9	5.3	6.1
21-22	4.4	5.6	5.5	4.4	5.3	6.1
22-23	4.2	5.7	6.1	3.8	6.2	6.0
23-24	4.1	5.5	7.3	3.5	7.0	5.9

TABLE C-15

SUMMARY OF ONE-HOUR AND NON-OVERLAPPING EIGHT-HOUR AVERAGES MEASURED IN THE SOUTH STATION AREA

All concentrations are in ppm

	Roselot Site			Tracks Site		
	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
One-Hour						
Maximum	6.3	11.9	11.3	7.1	14.3	8.9
2nd Highest	6.1	10.1	8.8	7.0	11.8	7.0
Eight-Hour						
Maximum	5.1	7.4	7.5	6.5	9.1	6.1
2nd Highest	5.1	7.4	7.3	6.5	9.0	6.1

TABLE C-16

SOUTH STATION AIR QUALITY STUDY

L ROSELOT   WIND DIRECTION (DEGREES)   DATA FOR OCTOBER 1974

HOURS (LST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24
1	289.	287.	286.	278.	273.	267.	280.	275.	273.	274.	280.	289.	289.	280.	270.	91.	110.	94.	888.	137.	147.	139.	92.	277.
2	268.	273.	85.	77.	264.	264.	262.	261.	287.	290.	289.	294.	242.	260.	279.	285.	278.	281.	291.	290.	116.	111.	888.	270.
3	270.	263.	263.	888.	255.	272.	274.	273.	280.	271.	276.	265.	274.	272.	270.	270.	267.	272.	275.	288.	275.	270.	280.	281.
4	274.	281.	268.	260.	282.	282.	280.	285.	279.	281.	279.	280.	289.	289.	297.	286.	284.	280.	280.	284.	299.	293.	294.	291.
5	296.	306.	301.	297.	310.	298.	288.	288.	288.	287.	271.	255.	268.	274.	280.	268.	257.	249.	255.	247.	237.	254.	240.	258.
6	255.	246.	281.	258.	278.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.
7	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	246.	240.	246.	277.	284.	289.	289.	291.	284.	278.	288.	296.	277.
8	257.	258.	276.	254.	249.	257.	264.	271.	273.	259.	134.	888.	147.	115.	137.	999.	91.	129.	269.	267.	256.	270.	262.	274.
9	271.	265.	276.	285.	262.	285.	285.	282.	286.	117.	124.	132.	125.	107.	151.	117.	107.	163.	888.	266.	272.	264.	264.	265.
10	264.	265.	265.	250.	266.	265.	264.	255.	269.	249.	257.	259.	250.	246.	269.	285.	281.	281.	282.	283.	278.	280.	284.	285.
11	269.	263.	272.	267.	262.	267.	279.	262.	275.	280.	273.	888.	888.	88.	868.	74.	96.	888.	277.	261.	272.	287.	289.	265.
12	243.	241.	252.	248.	251.	246.	259.	257.	260.	263.	267.	256.	256.	256.	257.	258.	257.	251.	250.	251.	257.	262.	265.	249.
13	286.	270.	266.	274.	265.	888.	888.	888.	132.	138.	136.	117.	888.	888.	888.	888.	137.	888.	119.	131.	146.	190.	271.	256.
14	882.	255.	265.	276.	276.	888.	888.	888.	888.	888.	888.	274.	270.	267.	274.	267.	293.	285.	276.	270.	267.	278.	294.	275.
15	263.	273.	280.	275.	275.	267.	262.	275.	284.	287.	261.	241.	262.	271.	279.	286.	286.	284.	284.	281.	277.	288.	279.	271.
16	131.	117.	128.	127.	122.	117.	126.	132.	126.	147.	141.	124.	104.	110.	125.	140.	152.	161.	165.	145.	157.	888.	258.	264.
17	888.	888.	259.	274.	280.	276.	277.	265.	296.	292.	272.	999.	263.	260.	281.	242.	284.	271.	272.	272.	264.	272.	275.	257.
18	248.	261.	271.	278.	276.	273.	273.	273.	276.	281.	279.	279.	269.	275.	278.	282.	282.	277.	275.	278.	284.	282.	278.	279.
19	269.	276.	261.	288.	275.	261.	278.	277.	280.	275.	282.	286.	278.	245.	269.	275.	271.	271.	263.	258.	888.	275.	277.	257.
20	888.	888.	271.	265.	269.	280.	280.	267.	277.	288.	280.	285.	278.	271.	272.	284.	290.	285.	273.	275.	280.	279.	281.	283.
21	270.	277.	274.	278.	279.	272.	261.	257.	264.	271.	267.	258.	277.	275.	266.	272.	273.	288.	268.	274.	276.	268.	259.	257.
22	285.	271.	274.	272.	245.	241.	247.	247.	259.	263.	242.	242.	260.	257.	258.	263.	258.	243.	233.	232.	228.	232.	235.	243.
23	250.	250.	269.	294.	280.	284.	274.	269.	276.	288.	267.	263.	275.	265.	269.	278.	262.	272.	268.	258.	262.	275.	274.	269.
24	272.	276.	280.	266.	288.	281.	275.	265.	269.	290.	280.	273.	273.	255.	281.	267.	276.	273.	255.	265.	273.	275.	269.	256.
25	243.	243.	249.	265.	278.	262.	249.	272.	276.	281.	271.	283.	262.	254.	252.	257.	259.	254.	247.	252.	259.	282.	270.	275.
26	283.	297.	295.	290.	284.	280.	277.	274.	282.	282.	287.	281.	284.	267.	248.	253.	257.	255.	249.	241.	257.	259.	248.	242.
27	243.	252.	270.	261.	248.	245.	244.	242.	261.	274.	880.	261.	269.	227.	265.	267.	256.	259.	238.	888.	880.	880.	267.	272.
28	281.	276.	277.	291.	294.	290.	287.	279.	284.	304.	295.	290.	265.	279.	266.	260.	255.	260.	263.	266.	264.	268.	256.	251.
29	245.	251.	258.	254.	242.	245.	240.	254.	248.	261.	260.	252.	249.	254.	262.	265.	271.	277.	261.	241.	247.	246.	242.	243.
30	244.	254.	256.	258.	261.	269.	261.	256.	272.	262.	269.	290.	274.	61.	90.	98.	95.	102.	106.	103.	84.	58.	84.	83.
31	56.	340.	248.	240.	243.	266.	275.	276.	283.	265.	276.	274.	243.	258.	253.	264.	277.	257.	240.	245.	256.	235.	231.	258.

TOTAL HOURS = 744   NUMBER OF GOOD HOURS = 712   NUMBER OF MISSING HOURS = 32   DATA CAPTURE = 95.70 (PERCENT)

THE ABOVE ROW IS DATA CAPTURE STATISTICS

NOTE : 999 - MISSING VALUE INDICATOR

888 - VARIABLE WIND DIRECTION INDICATOR   0 WIND DIRECTION INDICATES CALM CONDITION

TABLE C-17

SOUTH STATION AIR QUALITY STUDY

L ROSELOT WIND DIRECTION (DEGREES) DATA FOR NOVEMBER 1974

HOURS (LST)

DAY HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	252.	257.	253.	250.	254.	244.	241.	247.	255.	254.	253.	261.	265.	253.	277.	270.	246.	244.	243.	242.	279.	217.	259.	99.
2	115.	205.	270.	268.	271.	223.	162.	183.	218.	221.	208.	197.	115.	122.	148.	177.	176.	205.	338.	250.	257.	268.	218.	275.
3	269.	279.	286.	285.	289.	266.	269.	284.	292.	282.	278.	278.	284.	267.	264.	95.	77.	95.	92.	103.	320.	261.	263.	264.
4	250.	246.	75.	300.	255.	278.	254.	253.	257.	261.	262.	272.	261.	245.	283.	273.	263.	288.	274.	282.	258.	277.	211.	148.
5	161.	147.	142.	134.	127.	151.	138.	155.	156.	141.	141.	155.	113.	96.	109.	108.	97.	99.	110.	130.	138.	195.	255.	127.
6	163.	190.	217.	213.	165.	279.	229.	276.	283.	284.	287.	300.	275.	263.	285.	270.	247.	270.	320.	317.	264.	291.	286.	252.
7	199.	281.	201.	270.	268.	247.	246.	142.	167.	250.	264.	149.	142.	148.	140.	142.	135.	140.	143.	140.	134.	155.	157.	252.
8	154.	167.	205.	224.	228.	167.	175.	150.	158.	158.	163.	165.	163.	168.	221.	208.	205.	198.	213.	228.	245.	244.	264.	269.
9	265.	274.	278.	281.	285.	264.	272.	271.	246.	167.	156.	142.	159.	141.	144.	132.	129.	132.	141.	173.	172.	146.	168.	261.
10	256.	254.	255.	221.	229.	227.	207.	213.	229.	137.	115.	117.	102.	93.	71.	76.	94.	95.	92.	107.	118.	178.	284.	280.
11	289.	289.	261.	271.	204.	288.	286.	279.	275.	108.	96.	84.	100.	144.	140.	148.	123.	119.	129.	100.	98.	103.	123.	141.
12	138.	223.	165.	132.	143.	138.	115.	117.	126.	143.	165.	174.	120.	101.	111.	113.	137.	132.	133.	143.	154.	159.	169.	155.
13	104.	103.	94.	101.	101.	92.	247.	262.	275.	292.	290.	291.	260.	258.	277.	222.	268.	262.	261.	259.	247.	240.	242.	240.
14	255.	261.	269.	274.	259.	279.	260.	244.	282.	277.	286.	294.	292.	299.	301.	299.	290.	294.	292.	266.	262.	272.	275.	287.
15	276.	276.	281.	289.	279.	275.	288.	293.	287.	256.	291.	300.	260.	279.	274.	279.	274.	266.	275.	272.	282.	265.	260.	243.
16	243.	258.	242.	246.	251.	252.	244.	240.	244.	259.	277.	276.	275.	279.	278.	288.	284.	269.	282.	217.	262.	275.	289.	296.
17	281.	255.	289.	303.	245.	266.	276.	263.	262.	260.	280.	286.	271.	262.	266.	260.	259.	267.	278.	281.	275.	278.	282.	291.
18	291.	293.	266.	272.	265.	253.	245.	244.	252.	258.	250.	254.	255.	283.	276.	282.	253.	245.	256.	257.	250.	242.	223.	227.
19	264.	262.	290.	270.	271.	283.	282.	274.	274.	275.	272.	279.	285.	286.	269.	283.	277.	255.	265.	277.	262.	274.	94.	146.
20	68.	75.	90.	86.	80.	73.	75.	119.	999.	90.	102.	101.	124.	135.	118.	108.	122.	120.	107.	60.	126.	52.	219.	270.
21	279.	273.	277.	264.	260.	266.	242.	226.	214.	207.	216.	221.	249.	263.	260.	264.	265.	244.	246.	237.	242.	248.	240.	262.
22	272.	272.	279.	286.	286.	276.	272.	276.	261.	256.	261.	261.	277.	284.	291.	263.	275.	273.	267.	255.	265.	269.	249.	266.
23	274.	272.	275.	277.	270.	277.	276.	272.	271.	266.	116.	91.	205.	88.	295.	253.	42.	279.	273.	267.	226.	217.	240.	250.
24	261.	273.	260.	270.	267.	248.	243.	237.	225.	212.	209.	215.	247.	260.	261.	259.	259.	257.	244.	226.	220.	220.	223.	229.
25	253.	258.	259.	253.	244.	231.	230.	231.	238.	261.	273.	264.	258.	283.	292.	289.	280.	219.	276.	273.	278.	274.	273.	275.
26	279.	273.	275.	287.	286.	287.	292.	286.	285.	277.	279.	288.	258.	267.	277.	272.	264.	278.	293.	247.	244.	282.	265.	266.
27	281.	292.	269.	284.	278.	272.	272.	277.	279.	278.	281.	292.	281.	269.	276.	279.	277.	274.	274.	279.	284.	275.	275.	274.
28	272.	275.	272.	272.	266.	273.	256.	277.	265.	266.	275.	250.	268.	275.	274.	272.	270.	273.	999.	999.	999.	999.	999.	999.
29	269.	270.	266.	274.	271.	268.	261.	252.	255.	267.	259.	262.	263.	273.	278.	276.	270.	271.	271.	273.	268.	258.	261.	256.
30	272.	269.	272.	271.	268.	265.	262.	265.	282.	254.	242.	223.	147.	135.	126.	100.	100.	83.	108.	127.	117.	133.	116.	143.

TOTAL HOURS = 720 NUMBER OF GOOD HOURS = 713 NUMBER OF MISSING HOURS = 7 DATA CAPTURE = 99,03 (PERCENT)

THE ABOVE ROW IS DATA CAPTURE STATISTICS

NOTE : 999 - MISSING VALUE INDICATOR

888 - VARIABLE WIND DIRECTION INDICATOR 0 WIND DIRECTION INDICATES CALM CONDITION

TABLE C-18

SOUTH STATION AIR QUALITY STUDY

L ROSELOT

WIND DIRECTION (DEGREES)

DATA FOR DECEMBER 1974

HOURS (LST)

DAY HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	268.	264.	267.	269.	273.	275.	268.	241.	279.	267.	262.	177.	92.	139.	137.	145.	145.	147.	114.	111.	103.	106.	110.	143.
2	105.	97.	115.	125.	129.	153.	130.	147.	153.	162.	162.	138.	134.	111.	263.	203.	281.	268.	290.	195.	269.	279.	282.	291.
3	279.	284.	283.	284.	274.	276.	292.	294.	295.	300.	302.	286.	285.	281.	280.	276.	271.	266.	271.	262.	290.	279.	278.	273.
4	280.	278.	278.	275.	265.	261.	255.	271.	306.	302.	275.	267.	263.	263.	264.	261.	248.	280.	276.	277.	276.	273.	267.	271.
5	269.	268.	264.	273.	276.	273.	273.	262.	287.	282.	277.	269.	268.	274.	274.	280.	276.	281.	283.	262.	287.	267.	290.	265.
6	283.	280.	271.	265.	277.	291.	292.	290.	298.	307.	301.	281.	273.	271.	272.	292.	282.	277.	279.	110.	93.	54.	349.	332.
7	330.	246.	290.	245.	88.	282.	264.	60.	293.	350.	109.	97.	95.	97.	89.	66.	103.	115.	67.	131.	34.	86.	48.	246.
8	87.	64.	315.	10.	334.	305.	354.	313.	306.	305.	323.	315.	307.	326.	10.	98.	103.	87.	72.	262.	286.	277.	295.	295.
9	275.	271.	264.	272.	281.	290.	291.	269.	271.	277.	276.	288.	302.	302.	266.	266.	276.	290.	292.	291.	297.	293.	279.	276.
10	272.	277.	286.	292.	284.	295.	299.	296.	277.	254.	257.	276.	276.	279.	281.	263.	297.	311.	299.	303.	307.	309.	311.	303.
11	279.	254.	228.	280.	291.	293.	299.	294.	287.	256.	284.	299.	271.	247.	246.	263.	280.	279.	272.	266.	264.	278.	288.	285.
12	267.	278.	269.	258.	242.	260.	281.	288.	302.	302.	295.	308.	37.	303.	276.	278.	278.	270.	260.	259.	269.	285.	248.	300.
13	281.	259.	271.	273.	271.	279.	279.	259.	243.	263.	184.	154.	127.	121.	127.	153.	158.	178.	171.	169.	176.	184.	177.	147.
14	124.	115.	191.	157.	195.	209.	204.	179.	166.	172.	174.	178.	231.	273.	265.	237.	239.	256.	259.	256.	263.	271.	264.	251.
15	198.	170.	130.	165.	245.	270.	279.	275.	282.	242.	160.	137.	200.	194.	203.	220.	236.	243.	233.	234.	219.	213.	198.	182.
16	228.	236.	156.	161.	275.	240.	182.	173.	166.	162.	187.	171.	999.	128.	127.	131.	151.	159.	157.	159.	151.	172.	189.	157.
17	130.	131.	139.	136.	135.	276.	283.	302.	302.	313.	294.	277.	288.	276.	276.	273.	260.	266.	270.	275.	301.	314.	323.	268.
18	272.	275.	282.	242.	295.	304.	247.	293.	310.	317.	303.	294.	292.	293.	302.	304.	299.	303.	296.	307.	300.	303.	321.	293.
19	252.	264.	296.	306.	274.	246.	243.	258.	272.	267.	305.	274.	259.	270.	292.	290.	286.	281.	262.	273.	293.	244.	267.	250.
20	263.	265.	270.	268.	318.	325.	310.	303.	315.	321.	299.	262.	267.	216.	191.	180.	200.	218.	217.	220.	242.	301.	10.	13.
21	346.	323.	323.	347.	14.	29.	47.	62.	49.	32.	356.	330.	289.	298.	294.	296.	284.	247.	190.	207.	236.	255.	225.	174.
22	150.	177.	243.	274.	284.	249.	299.	294.	311.	308.	303.	284.	271.	208.	278.	281.	301.	249.	295.	310.	322.	320.	299.	287.
23	287.	294.	300.	306.	313.	318.	324.	314.	308.	292.	285.	273.	268.	283.	280.	266.	236.	238.	252.	255.	253.	252.	257.	255.
24	250.	244.	266.	275.	267.	283.	289.	295.	290.	293.	284.	269.	282.	285.	274.	280.	281.	286.	303.	295.	293.	305.	328.	306.
25	276.	280.	275.	257.	236.	193.	174.	174.	171.	159.	152.	156.	146.	217.	284.	293.	285.	306.	294.	278.	275.	272.	267.	279.
26	290.	273.	277.	292.	285.	281.	260.	285.	308.	319.	313.	296.	292.	301.	307.	305.	313.	307.	287.	269.	280.	300.	299.	294.
27	245.	254.	252.	258.	252.	276.	304.	277.	267.	271.	259.	229.	243.	255.	247.	236.	247.	247.	246.	247.	270.	272.	270.	281.
28	291.	279.	281.	272.	277.	266.	279.	261.	291.	205.	280.	271.	276.	272.	279.	284.	277.	274.	278.	277.	284.	291.	276.	271.
29	303.	279.	265.	253.	288.	268.	236.	234.	239.	243.	242.	271.	283.	274.	274.	282.	265.	258.	269.	243.	257.	252.	248.	245.
30	251.	250.	234.	236.	246.	247.	250.	255.	248.	240.	241.	252.	283.	262.	253.	265.	294.	286.	278.	296.	260.	252.	255.	261.
31	262.	291.	286.	296.	287.	261.	277.	273.	273.	269.	262.	266.	292.	260.	276.	274.	269.	260.	286.	269.	284.	273.	249.	257.

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 743 NUMBER OF MISSING HOURS = 1 DATA CAPTURE = 99.87 (PERCENT)

THE ABOVE ROW IS DATA CAPTURE STATISTICS

NOTE : 999 - MISSING VALUE INDICATOR

888 - VARIABLE WIND DIRECTION INDICATOR 0 WIND DIRECTION INDICATES CALM CONDITION

TABLE C-19

SOUTH STATE AIR QUALITY STUDY

L ROSELOT WIND SPEED (MILES PER HOUR) DATA FOR OCTOBER 1974

HOURS (CST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	AVG
1	8.	6.	6.	6.	5.	4.	5.	5.	6.	5.	5.	4.	5.	5.	5.	4.	4.	5.	5.	4.	4.	4.	4.	3.	5.
2	2.	2.	2.	3.	4.	5.	6.	5.	6.	7.	6.	6.	7.	6.	4.	4.	5.	7.	6.	4.	4.	4.	3.	4.	5.
3	5.	5.	5.	3.	3.	4.	6.	8.	7.	6.	7.	6.	7.	6.	7.	8.	6.	8.	7.	6.	6.	5.	5.	6.	6.
4	8.	6.	5.	4.	5.	5.	4.	5.	6.	8.	9.	8.	8.	8.	8.	9.	7.	7.	6.	5.	5.	7.	6.	7.	7.
5	7.	7.	6.	5.	5.	6.	5.	7.	8.	6.	6.	6.	6.	6.	6.	6.	4.	4.	4.	5.	6.	6.	9.	8.	6.
6	7.	6.	7.	7.	6.	5.	5.	6.	5.	3.	5.	4.	3.	5.	5.	5.	5.	4.	4.	4.	5.	6.	6.	6.	5.
7	5.	5.	6.	5.	5.	6.	6.	8.	8.	6.	5.	5.	8.	8.	7.	6.	8.	9.	9.	9.	8.	8.	7.	6.	7.
8	5.	4.	6.	6.	6.	6.	6.	7.	5.	3.	4.	4.	3.	5.	5.	999.	4.	3.	3.	2.	2.	2.	3.	4.	4.
9	6.	4.	4.	5.	4.	4.	4.	4.	4.	4.	5.	3.	4.	3.	4.	4.	4.	1.	2.	3.	2.	3.	2.	2.	4.
10	2.	2.	2.	2.	2.	4.	2.	5.	5.	6.	7.	7.	7.	8.	8.	8.	7.	6.	6.	4.	5.	4.	4.	5.	5.
11	6.	5.	5.	5.	6.	7.	6.	6.	6.	5.	4.	3.	3.	4.	4.	4.	4.	3.	3.	5.	4.	3.	3.	3.	4.
12	5.	5.	5.	6.	4.	4.	5.	4.	5.	7.	9.	9.	8.	6.	6.	5.	6.	6.	6.	5.	4.	5.	6.	6.	6.
13	5.	4.	6.	6.	6.	3.	3.	3.	5.	5.	6.	7.	6.	6.	5.	4.	4.	4.	4.	4.	4.	4.	3.	2.	5.
14	2.	2.	4.	6.	3.	3.	2.	2.	3.	4.	5.	5.	6.	5.	6.	6.	5.	5.	5.	5.	6.	7.	7.	5.	5.
15	5.	4.	4.	5.	4.	4.	4.	5.	6.	7.	6.	8.	7.	9.	9.	8.	8.	8.	8.	7.	5.	5.	4.	3.	6.
16	3.	4.	4.	5.	5.	6.	6.	6.	5.	5.	4.	5.	7.	6.	7.	7.	5.	4.	4.	4.	4.	3.	3.	3.	5.
17	3.	4.	4.	6.	6.	5.	4.	4.	4.	3.	4.	999.	5.	6.	5.	5.	5.	5.	3.	4.	5.	5.	5.	5.	5.
18	4.	5.	7.	7.	7.	7.	8.	8.	8.	9.	10.	8.	7.	6.	7.	6.	5.	6.	5.	5.	5.	5.	6.	6.	7.
19	4.	5.	5.	5.	6.	7.	6.	5.	5.	6.	5.	4.	4.	4.	4.	5.	5.	5.	4.	4.	4.	5.	6.	5.	5.
20	3.	3.	4.	5.	6.	5.	5.	5.	6.	8.	8.	8.	9.	7.	8.	8.	8.	8.	9.	9.	6.	7.	6.	5.	7.
21	6.	6.	7.	6.	6.	6.	6.	7.	8.	7.	6.	8.	7.	7.	7.	7.	7.	6.	6.	5.	5.	3.	2.	3.	6.
22	4.	4.	4.	3.	3.	3.	3.	4.	5.	5.	5.	5.	8.	7.	7.	6.	6.	6.	6.	7.	7.	6.	7.	6.	5.
23	5.	6.	6.	6.	6.	6.	6.	6.	6.	6.	7.	6.	6.	5.	5.	5.	6.	5.	4.	5.	5.	5.	5.	5.	6.
24	7.	9.	6.	5.	6.	5.	5.	6.	5.	4.	5.	5.	3.	5.	5.	4.	4.	3.	3.	4.	4.	4.	3.	4.	5.
25	5.	6.	5.	4.	3.	4.	4.	5.	5.	7.	7.	7.	6.	6.	6.	6.	5.	6.	6.	6.	5.	5.	5.	5.	5.
26	6.	6.	5.	5.	5.	8.	8.	9.	8.	8.	9.	7.	5.	7.	8.	7.	6.	6.	6.	7.	7.	7.	7.	7.	7.
27	7.	6.	7.	7.	6.	6.	5.	5.	4.	5.	5.	6.	6.	5.	5.	6.	5.	4.	3.	3.	3.	3.	5.	5.	5.
28	5.	7.	4.	4.	4.	4.	4.	5.	5.	5.	4.	4.	5.	5.	5.	4.	4.	4.	4.	4.	5.	4.	6.	4.	5.
29	3.	4.	5.	3.	4.	3.	3.	5.	6.	6.	7.	6.	6.	8.	6.	5.	5.	4.	4.	5.	5.	6.	7.	6.	5.
30	5.	4.	4.	4.	4.	4.	4.	3.	4.	4.	4.	3.	2.	3.	4.	6.	6.	4.	5.	5.	4.	4.	4.	4.	4.
31	4.	2.	3.	5.	3.	3.	3.	4.	4.	5.	8.	5.	4.	4.	6.	4.	4.	4.	5.	4.	5.	6.	7.	7.	4.
	5.	5.	5.	5.	5.	5.	5.	5.	6.	6.	6.	6.	6.	6.	6.	6.	5.	5.	5.	5.	5.	5.	5.	5.	
	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	30.	31.	31.	31.	30.	31.	31.	31.	31.	31.	31.	31.	31.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 742 NUMBER OF MISSING HOURS = 2 DATA CAPTURE = 99.73 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 5.240 MAXIMUM HOURLY VALUE = 10.000MAXIMUM VALUE OCCURED ON DAY 18 , HOUR ENDING 11

TABLE C-20

SOUTH STATION AIR QUALITY STUDY

L ROSELOT

WIND SPEED (MILES PER HOUR)

DATA FOR NOVEMBER 1974

HOURS (LST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	AVG
1	6.	5.	7.	7.	5.	5.	6.	7.	6.	7.	7.	7.	8.	6.	6.	6.	5.	5.	5.	4.	5.	4.	4.	4.	6.
2	2.	2.	4.	3.	3.	3.	3.	4.	5.	4.	5.	5.	5.	6.	5.	4.	3.	3.	3.	2.	2.	2.	5.	6.	4.
3	4.	5.	6.	5.	4.	4.	4.	4.	4.	5.	4.	8.	4.	4.	3.	4.	3.	3.	3.	2.	1.	2.	3.	4.	4.
4	3.	2.	2.	3.	3.	4.	3.	4.	5.	6.	5.	5.	6.	6.	6.	3.	2.	3.	3.	3.	3.	2.	2.	3.	4.
5	2.	4.	5.	4.	4.	4.	4.	4.	4.	4.	5.	5.	4.	4.	5.	6.	6.	5.	5.	5.	5.	4.	3.	4.	4.
6	3.	3.	3.	3.	3.	3.	4.	3.	3.	3.	4.	5.	4.	4.	2.	3.	3.	2.	2.	3.	4.	4.	5.	3.	3.
7	2.	3.	5.	5.	4.	3.	3.	4.	6.	4.	4.	3.	5.	4.	4.	5.	5.	4.	4.	5.	5.	5.	4.	4.	4.
8	4.	3.	4.	5.	4.	3.	4.	5.	5.	5.	5.	5.	5.	5.	5.	3.	4.	3.	3.	4.	4.	3.	4.	5.	4.
9	4.	6.	6.	6.	7.	7.	7.	6.	5.	4.	3.	4.	7.	7.	6.	5.	5.	4.	4.	4.	5.	5.	4.	4.	5.
10	3.	4.	4.	4.	3.	4.	4.	3.	3.	3.	3.	4.	6.	7.	6.	5.	4.	4.	4.	3.	2.	2.	4.	5.	4.
11	6.	4.	6.	5.	2.	4.	5.	5.	3.	5.	5.	4.	4.	4.	4.	4.	5.	5.	5.	6.	5.	4.	4.	3.	4.
12	2.	2.	3.	3.	4.	5.	6.	6.	7.	7.	7.	5.	4.	5.	6.	6.	5.	5.	6.	5.	4.	5.	5.	5.	5.
13	7.	7.	7.	7.	5.	5.	7.	7.	9.	11.	11.	10.	8.	9.	9.	7.	6.	7.	6.	5.	5.	5.	5.	6.	7.
14	6.	5.	4.	3.	2.	2.	2.	2.	3.	3.	4.	7.	7.	8.	8.	6.	6.	6.	6.	6.	5.	5.	4.	4.	5.
15	4.	5.	5.	4.	3.	5.	6.	7.	8.	10.	6.	10.	8.	8.	7.	8.	7.	8.	8.	7.	7.	7.	7.	6.	7.
16	7.	6.	6.	6.	5.	6.	5.	6.	6.	8.	9.	8.	9.	9.	6.	7.	7.	7.	7.	7.	6.	5.	6.	5.	7.
17	5.	5.	6.	6.	6.	5.	5.	3.	2.	3.	4.	5.	5.	5.	5.	4.	3.	3.	4.	5.	6.	6.	6.	6.	5.
18	4.	4.	4.	5.	4.	5.	6.	5.	6.	6.	6.	7.	6.	8.	7.	6.	4.	4.	5.	4.	2.	2.	2.	1.	5.
19	3.	3.	3.	1.	4.	4.	4.	5.	6.	4.	3.	5.	5.	4.	4.	4.	4.	4.	4.	5.	3.	4.	2.	2.	4.
20	1.	3.	3.	3.	2.	3.	3.	2.	2.	3.	3.	4.	3.	4.	5.	5.	5.	3.	4.	3.	1.	1.	3.	3.	3.
21	5.	4.	4.	4.	6.	6.	6.	6.	5.	7.	4.	9.	8.	12.	9.	10.	8.	8.	7.	4.	3.	5.	6.	7.	7.
22	9.	10.	11.	11.	9.	7.	8.	8.	6.	6.	7.	7.	9.	8.	8.	8.	8.	7.	7.	7.	7.	7.	6.	6.	6.
23	6.	5.	6.	5.	5.	5.	5.	5.	5.	4.	3.	3.	3.	3.	1.	2.	3.	2.	3.	3.	4.	3.	5.	2.	4.
24	4.	4.	3.	4.	5.	6.	6.	7.	7.	6.	5.	7.	9.	7.	7.	6.	4.	5.	5.	4.	3.	2.	3.	4.	5.
25	5.	5.	5.	5.	4.	3.	4.	3.	5.	3.	4.	4.	3.	3.	5.	6.	7.	6.	7.	8.	7.	9.	9.	9.	5.
26	7.	8.	9.	10.	10.	9.	9.	10.	13.	15.	15.	14.	12.	14.	15.	13.	11.	11.	11.	12.	12.	11.	10.	10.	11.
27	8.	9.	7.	7.	6.	7.	7.	7.	7.	7.	9.	9.	7.	7.	7.	6.	6.	5.	6.	6.	4.	3.	4.	4.	6.
28	3.	4.	3.	3.	3.	4.	3.	4.	4.	4.	2.	1.	2.	3.	4.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.
29	4.	4.	4.	4.	3.	4.	4.	6.	6.	5.	4.	4.	5.	4.	5.	4.	5.	5.	5.	4.	5.	5.	6.	5.	5.
30	5.	5.	5.	5.	5.	5.	5.	4.	5.	4.	3.	3.	3.	3.	3.	4.	4.	3.	2.	2.	2.	2.	2.	1.	4.
	4.	5.	5.	5.	4.	5.	5.	5.	5.	6.	6.	6.	6.	6.	6.	6.	5.	5.	5.	5.	4.	4.	5.	5.	
	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	29.	29.	29.	29.	29.	29.	29.	29.	29.	

TOTAL HOURS = 720 NUMBER OF GOOD HOURS = 711 NUMBER OF MISSING HOURS = 9 DATA CAPTURE = 98.75 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 5.041 MAXIMUM HOURLY VALUE = 15.000MAXIMUM VALUE OCCURED ON DAY 26 , HOUR ENDING 10

TABLE C-21

SOUTH STATION AIR QUALITY STUDY

L ROSELUT WIND SPEED (MILES PER HOUR) DATA FOR DECEMBER 1974

HOURS (LST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24	AVG
1	4.	5.	4.	5.	5.	5.	3.	3.	4.	3.	3.	2.	2.	4.	5.	4.	6.	6.	6.	6.	7.	8.	7.	9.	5.
2	9.	10.	10.	10.	10.	9.	10.	11.	11.	12.	13.	15.	5.	3.	4.	3.	5.	5.	7.	5.	999.	999.	999.	999.	8.
3	6.	6.	5.	5.	4.	5.	6.	7.	7.	8.	9.	11.	8.	6.	10.	10.	9.	8.	8.	9.	10.	11.	11.	12.	8.
4	9.	10.	10.	10.	6.	8.	6.	9.	10.	10.	10.	11.	10.	10.	9.	7.	8.	8.	9.	9.	7.	7.	6.	7.	9.
5	7.	8.	7.	6.	5.	5.	5.	6.	7.	8.	6.	6.	4.	4.	4.	4.	5.	5.	5.	5.	5.	5.	6.	6.	6.
6	5.	6.	6.	5.	5.	6.	6.	5.	5.	6.	6.	6.	7.	7.	7.	5.	4.	4.	4.	4.	4.	3.	2.	2.	5.
7	1.	2.	2.	2.	2.	3.	2.	3.	2.	3.	4.	4.	4.	4.	5.	5.	4.	3.	2.	2.	2.	2.	2.	1.	3.
8	4.	5.	4.	4.	3.	3.	3.	3.	4.	5.	5.	5.	6.	6.	6.	5.	5.	5.	5.	7.	6.	4.	6.	7.	5.
9	4.	4.	3.	4.	4.	4.	4.	6.	7.	9.	9.	10.	10.	10.	6.	6.	7.	7.	8.	8.	8.	10.	8.	6.	7.
10	6.	5.	5.	6.	6.	6.	6.	7.	7.	7.	6.	9.	9.	8.	9.	10.	9.	10.	9.	9.	9.	9.	8.	8.	8.
11	6.	6.	6.	8.	8.	8.	6.	7.	5.	6.	7.	7.	6.	7.	8.	8.	7.	7.	6.	6.	5.	5.	4.	4.	6.
12	3.	1.	5.	3.	5.	3.	2.	3.	3.	5.	4.	5.	3.	4.	5.	8.	7.	6.	7.	6.	7.	7.	7.	5.	5.
13	5.	4.	6.	7.	6.	4.	3.	4.	4.	4.	3.	3.	2.	4.	4.	3.	5.	5.	6.	6.	6.	5.	5.	4.	5.
14	4.	4.	4.	4.	5.	4.	5.	8.	6.	3.	2.	3.	3.	3.	4.	4.	4.	6.	7.	5.	7.	9.	6.	4.	5.
15	3.	3.	3.	2.	2.	3.	5.	5.	3.	3.	4.	6.	6.	7.	6.	7.	6.	6.	6.	7.	8.	7.	6.	5.	5.
16	3.	6.	7.	5.	3.	3.	3.	3.	4.	7.	7.	6.	999.	5.	7.	9.	10.	11.	11.	12.	10.	10.	10.	8.	7.
17	5.	6.	7.	9.	7.	7.	9.	10.	9.	7.	7.	6.	7.	6.	8.	7.	10.	10.	8.	6.	6.	6.	6.	5.	7.
18	6.	7.	8.	8.	8.	9.	6.	8.	9.	8.	6.	10.	10.	9.	12.	13.	15.	14.	11.	10.	8.	8.	10.	8.	9.
19	8.	9.	8.	5.	5.	3.	0.	1.	2.	4.	3.	5.	7.	7.	6.	8.	6.	5.	4.	3.	4.	5.	5.	6.	5.
20	6.	6.	6.	5.	6.	7.	7.	6.	7.	5.	3.	7.	5.	5.	5.	5.	5.	6.	6.	7.	8.	7.	4.	2.	6.
21	3.	3.	3.	2.	5.	5.	4.	3.	2.	1.	0.	2.	3.	2.	4.	6.	5.	4.	4.	3.	4.	6.	5.	4.	3.
22	3.	3.	3.	5.	5.	6.	6.	8.	7.	7.	7.	7.	5.	4.	2.	5.	9.	11.	11.	10.	10.	10.	6.	7.	7.
23	5.	4.	3.	3.	6.	6.	6.	5.	7.	6.	5.	6.	7.	6.	5.	5.	8.	9.	8.	8.	8.	9.	8.	8.	6.
24	7.	5.	6.	6.	5.	5.	5.	5.	6.	5.	4.	6.	6.	6.	5.	5.	5.	6.	6.	6.	7.	6.	7.	6.	6.
25	5.	5.	4.	3.	4.	5.	6.	4.	6.	7.	4.	3.	3.	2.	5.	5.	4.	999.	999.	999.	999.	999.	999.	999.	999.
26	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	7.	8.	8.	7.	5.	5.	5.	5.	4.	4.	999.
27	4.	4.	4.	3.	5.	4.	3.	4.	5.	6.	7.	7.	7.	9.	7.	6.	4.	3.	4.	5.	5.	5.	6.	6.	5.
28	1.	5.	6.	6.	5.	6.	5.	6.	6.	5.	5.	4.	7.	7.	6.	8.	5.	6.	6.	5.	4.	3.	4.	2.	5.
29	2.	2.	2.	3.	2.	2.	2.	4.	5.	4.	3.	5.	6.	6.	5.	3.	2.	3.	4.	4.	4.	6.	5.	5.	4.
30	5.	4.	5.	4.	5.	4.	4.	6.	5.	5.	5.	4.	6.	5.	5.	8.	8.	7.	8.	7.	8.	6.	7.	7.	6.
31	5.	4.	4.	5.	6.	6.	6.	6.	7.	5.	4.	4.	5.	5.	4.	5.	3.	5.	4.	4.	4.	4.	4.	5.	5.
	5.	5.	5.	5.	5.	5.	5.	6.	6.	6.	6.	6.	6.	6.	6.	6.	6.	7.	7.	6.	6.	6.	6.	6.	
	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	29.	30.	31.	31.	31.	30.	30.	30.	29.	29.	29.	29.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 718 NUMBER OF MISSING HOURS = 26 DATA CAPTURE = 96.51 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 5.776 MAXIMUM HOURLY VALUE = 15.000MAXIMUM VALUE OCCURED ON DAY 2 , HOUR ENDING 12

TABLE C-22

SOUTH STATION AIR QUALITY STUDY

M TRACKS WIND DIRECTION (DEGREES) DATA FOR OCTOBER 1974

HOURS (LST)

DAY HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	283.	284.	269.	286.	290.	298.	310.	319.	340.	888.	888.	888.	284.	888.	888.	888.	105.	160.	190.	174.	48.	888.	255.	217.
2	224.	234.	154.	233.	259.	301.	301.	298.	284.	266.	303.	299.	297.	274.	244.	248.	246.	272.	297.	342.	56.	42.	35.	10.
3	347.	334.	353.	39.	32.	350.	342.	346.	346.	5.	338.	339.	327.	350.	9.	5.	340.	328.	342.	329.	319.	327.	326.	327.
4	306.	295.	301.	313.	284.	274.	269.	280.	300.	309.	257.	288.	275.	280.	291.	284.	281.	277.	285.	282.	262.	266.	279.	283.
5	241.	244.	288.	251.	250.	258.	250.	258.	259.	273.	244.	250.	253.	251.	260.	262.	262.	266.	264.	260.	260.	266.	265.	263.
6	262.	260.	271.	254.	239.	265.	266.	274.	264.	254.	265.	250.	249.	267.	261.	269.	268.	256.	260.	265.	245.	247.	255.	253.
7	277.	277.	273.	267.	267.	273.	265.	254.	254.	251.	240.	234.	262.	264.	285.	282.	282.	292.	296.	294.	287.	292.	308.	347.
8	9.	351.	343.	338.	335.	335.	335.	340.	5.	27.	53.	47.	57.	50.	44.	45.	49.	71.	211.	213.	224.	244.	268.	306.
9	323.	302.	296.	310.	321.	289.	280.	297.	319.	40.	66.	62.	50.	123.	181.	40.	67.	43.	230.	208.	213.	231.	248.	254.
10	253.	226.	247.	255.	246.	251.	242.	252.	255.	250.	252.	262.	263.	268.	274.	282.	293.	284.	241.	301.	285.	295.	313.	352.
11	325.	343.	349.	359.	350.	343.	330.	338.	356.	888.	888.	888.	128.	888.	888.	888.	888.	212.	208.	210.	215.	217.	226.	244.
12	268.	256.	272.	271.	255.	244.	237.	251.	232.	241.	256.	284.	255.	267.	254.	241.	241.	246.	245.	242.	242.	250.	253.	275.
13	312.	336.	342.	1.	2.	13.	40.	47.	49.	57.	62.	57.	49.	58.	888.	888.	888.	888.	888.	888.	888.	217.	226.	238.
14	238.	243.	291.	321.	317.	888.	888.	217.	888.	888.	219.	224.	228.	233.	229.	227.	234.	239.	216.	214.	210.	216.	219.	226.
15	243.	246.	251.	250.	246.	247.	240.	234.	234.	246.	252.	265.	277.	285.	284.	286.	287.	305.	311.	315.	312.	888.	323.	888.
16	888.	53.	52.	40.	45.	62.	56.	53.	46.	51.	52.	50.	47.	49.	48.	53.	49.	44.	41.	33.	31.	35.	42.	21.
17	50.	24.	312.	334.	341.	341.	293.	293.	296.	225.	232.	234.	236.	219.	228.	229.	230.	250.	250.	226.	248.	243.	243.	205.
18	252.	260.	274.	283.	289.	312.	339.	343.	332.	325.	331.	347.	351.	313.	345.	297.	323.	319.	321.	353.	349.	331.	321.	322.
19	296.	291.	288.	300.	296.	294.	294.	288.	303.	341.	888.	288.	888.	888.	888.	888.	888.	355.	53.	43.	41.	10.	354.	15.
20	3.	9.	342.	322.	302.	308.	313.	310.	341.	344.	329.	330.	315.	305.	341.	309.	321.	306.	330.	338.	340.	344.	337.	339.
21	313.	302.	323.	327.	324.	329.	327.	305.	343.	341.	351.	348.	307.	337.	322.	324.	326.	337.	314.	330.	333.	258.	246.	248.
22	253.	263.	260.	261.	247.	242.	238.	240.	244.	243.	242.	254.	258.	272.	270.	272.	266.	262.	254.	252.	246.	249.	261.	273.
23	253.	254.	277.	266.	318.	313.	308.	298.	292.	305.	339.	342.	317.	348.	349.	358.	358.	344.	327.	330.	347.	353.	349.	356.
24	331.	343.	326.	333.	332.	325.	324.	333.	331.	888.	888.	356.	297.	317.	272.	261.	254.	227.	212.	221.	219.	217.	233.	245.
25	251.	203.	247.	246.	251.	236.	229.	234.	220.	215.	223.	241.	246.	246.	259.	242.	244.	243.	249.	250.	250.	259.	260.	262.
26	271.	292.	310.	339.	327.	300.	327.	337.	339.	322.	321.	295.	276.	279.	255.	267.	269.	262.	264.	257.	262.	262.	267.	264.
27	261.	257.	283.	270.	262.	257.	251.	247.	266.	356.	26.	358.	321.	359.	7.	354.	352.	360.	17.	25.	11.	888.	343.	333.
28	888.	352.	343.	317.	294.	275.	271.	310.	285.	287.	248.	265.	252.	252.	244.	236.	217.	233.	232.	231.	239.	227.	255.	239.
29	224.	250.	264.	246.	254.	250.	253.	248.	246.	259.	242.	254.	249.	261.	253.	244.	233.	229.	235.	246.	260.	261.	257.	246.
30	260.	262.	256.	256.	253.	240.	250.	263.	258.	256.	242.	221.	248.	215.	52.	41.	44.	39.	56.	66.	73.	76.	84.	64.
31	52.	235.	245.	251.	249.	234.	224.	226.	240.	245.	246.	257.	250.	230.	234.	242.	240.	238.	237.	243.	245.	244.	248.	250.

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 744 NUMBER OF MISSING HOURS = 0 DATA CAPTURE = 100.00 (PERCENT)

THE ABOVE ROW IS DATA CAPTURE STATISTICS

NOTE : 999 - MISSING VALUE INDICATOR

888 - VARIABLE WIND DIRECTION INDICATOR 0 WIND DIRECTION INDICATES CALM CONDITION

TABLE C-23

SOUTH STATION AIR QUALITY STUDY

M TRACKS   WIND DIRECTION (DEGREES)   DATA FOR NOVEMBER 1974

DAY	HOURS (LST)																							
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
HR-END	01	02	.03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	251.	261.	263.	260.	260.	262.	261.	256.	250.	242.	267.	272.	271.	273.	274.	274.	267.	260.	248.	261.	276.	290.	52.	79.
2	58.	343.	348.	359.	5.	9.	38.	28.	19.	19.	40.	50.	63.	52.	41.	52.	173.	172.	158.	159.	205.	241.	336.	349.
3	335.	313.	304.	296.	292.	301.	290.	274.	268.	275.	261.	265.	248.	279.	217.	59.	73.	48.	58.	75.	255.	223.	230.	226.
4	258.	223.	203.	205.	218.	225.	230.	229.	253.	255.	269.	277.	282.	300.	342.	312.	306.	307.	284.	278.	260.	253.	32.	30.
5	45.	32.	46.	41.	44.	51.	61.	63.	54.	48.	50.	69.	64.	64.	61.	63.	56.	50.	52.	51.	55.	41.	24.	33.
6	53.	28.	24.	21.	11.	350.	19.	273.	288.	284.	269.	264.	270.	285.	257.	263.	240.	250.	253.	232.	275.	313.	350.	27.
7	36.	335.	355.	354.	344.	300.	13.	29.	44.	20.	354.	32.	60.	67.	60.	52.	42.	39.	47.	50.	48.	46.	43.	25.
8	35.	22.	7.	2.	17.	34.	47.	47.	53.	47.	43.	34.	39.	31.	8.	8.	34.	5.	353.	13.	26.	23.	19.	309.
9	24.	15.	10.	4.	350.	359.	358.	343.	20.	49.	55.	55.	51.	55.	49.	53.	56.	55.	49.	40.	38.	28.	16.	9.
10	45.	37.	27.	28.	25.	29.	31.	20.	26.	53.	39.	43.	76.	62.	60.	46.	96.	71.	49.	46.	29.	85.	320.	331.
11	322.	16.	313.	321.	259.	302.	303.	284.	310.	60.	53.	40.	30.	3.	38.	43.	42.	52.	49.	51.	51.	48.	44.	50.
12	46.	40.	39.	45.	42.	45.	51.	50.	46.	49.	64.	63.	57.	58.	51.	50.	49.	52.	50.	58.	54.	44.	46.	48.
13	51.	65.	65.	53.	43.	247.	213.	256.	247.	250.	253.	270.	265.	281.	266.	260.	264.	244.	241.	258.	246.	255.	256.	259.
14	219.	245.	244.	241.	242.	235.	224.	213.	212.	216.	210.	222.	225.	226.	224.	235.	236.	232.	228.	213.	208.	206.	211.	228.
15	225.	221.	249.	236.	250.	300.	288.	263.	272.	256.	261.	274.	264.	259.	266.	280.	281.	267.	260.	264.	263.	257.	254.	264.
16	260.	267.	266.	271.	261.	262.	263.	261.	267.	270.	276.	250.	286.	275.	281.	283.	284.	276.	277.	280.	268.	248.	241.	248.
17	253.	252.	255.	257.	259.	296.	253.	247.	231.	243.	256.	257.	250.	249.	255.	243.	252.	251.	266.	275.	279.	314.	324.	264.
18	279.	256.	248.	252.	245.	248.	245.	263.	260.	257.	258.	258.	265.	269.	270.	248.	249.	250.	251.	253.	231.	239.	267.	212.
19	250.	247.	250.	257.	285.	307.	302.	279.	246.	246.	243.	241.	280.	271.	269.	263.	255.	255.	264.	269.	273.	287.	197.	211.
20	197.	94.	54.	157.	182.	173.	157.	159.	164.	169.	184.	205.	166.	239.	252.	248.	279.	13.	59.	46.	293.	42.	248.	281.
21	347.	355.	349.	265.	274.	250.	240.	263.	251.	220.	221.	236.	245.	245.	256.	245.	246.	246.	254.	221.	207.	250.	279.	302.
22	343.	353.	338.	324.	323.	311.	304.	291.	271.	250.	254.	271.	334.	349.	348.	339.	318.	332.	325.	321.	315.	315.	317.	330.
23	333.	325.	321.	306.	313.	306.	300.	274.	251.	243.	106.	147.	70.	187.	201.	141.	179.	213.	216.	214.	223.	226.	222.	228.
24	230.	238.	243.	233.	255.	235.	237.	243.	230.	219.	217.	244.	244.	240.	240.	235.	234.	224.	229.	235.	215.	225.	227.	232.
25	257.	262.	256.	251.	245.	245.	241.	225.	221.	226.	241.	260.	261.	264.	262.	305.	341.	358.	334.	333.	326.	319.	338.	337.
26	324.	315.	301.	314.	312.	304.	301.	304.	318.	332.	348.	316.	311.	304.	300.	306.	314.	305.	293.	291.	284.	282.	259.	281.
27	292.	292.	293.	287.	284.	284.	264.	262.	283.	268.	266.	271.	272.	273.	282.	265.	295.	288.	288.	294.	294.	293.	282.	284.
28	315.	322.	337.	345.	332.	285.	280.	313.	315.	313.	275.	262.	282.	298.	306.	302.	296.	228.	255.	250.	212.	236.	301.	301.
29	312.	323.	312.	307.	310.	332.	343.	347.	335.	324.	325.	315.	288.	307.	311.	291.	330.	324.	325.	348.	327.	331.	333.	334.
30	340.	332.	339.	335.	326.	323.	325.	340.	13.	7.	23.	41.	46.	46.	63.	50.	53.	56.	65.	54.	37.	45.	45.	355.

TOTAL HOURS = 720   NUMBER OF GOOD HOURS = 720   NUMBER OF MISSING HOURS = 0   DATA CAPTURE = 100.00 (PERCENT)

THE ABOVE ROW IS DATA CAPTURE STATISTICS

NOTE : 999 - MISSING VALUE INDICATOR

888 - VARIABLE WIND DIRECTION INDICATOR   0 WIND DIRECTION INDICATES CALM CONDITION

TABLE C-24

SOUTH STATION AIR QUALITY STUDY

M TRACKS

WIND DIRECTION (DEGREES)

DATA FOR DECEMBER 1974

HOURS (LST)

DAY HR-BEG HR-END	00 01	01 02	02 03	03 04	04 05	05 06	06 07	07 08	08 09	09 10	10 11	11 12	12 13	13 14	14 15	15 16	16 17	17 18	18 19	19 20	20 21	21 22	22 23	23 24
1	1.	347.	330.	335.	325.	28.	14.	43.	317.	355.	62.	54.	51.	42.	43.	58.	47.	46.	49.	59.	62.	62.	57.	59.
2	51.	64.	66.	65.	55.	49.	55.	53.	56.	64.	66.	65.	58.	77.	240.	292.	292.	295.	286.	260.	352.	342.	341.	329.
3	314.	306.	287.	287.	277.	271.	259.	267.	238.	287.	279.	265.	286.	287.	288.	290.	293.	304.	308.	306.	295.	204.	290.	285.
4	293.	292.	280.	282.	292.	302.	304.	315.	340.	340.	318.	310.	336.	338.	342.	340.	340.	344.	346.	339.	342.	345.	335.	308.
5	330.	312.	321.	320.	286.	294.	314.	327.	1.	1.	350.	326.	299.	265.	264.	279.	287.	319.	286.	301.	317.	320.	319.	287.
6	276.	283.	303.	320.	322.	314.	312.	319.	314.	293.	289.	343.	320.	320.	278.	303.	244.	229.	8.	76.	86.	159.	219.	216.
7	231.	245.	222.	240.	225.	230.	230.	173.	256.	209.	195.	56.	39.	51.	59.	46.	46.	41.	888.	888.	888.	888.	888.	888.
8	20.	200.	206.	205.	203.	210.	211.	203.	205.	211.	216.	210.	209.	205.	195.	25.	39.	43.	121.	209.	221.	222.	216.	222.
9	222.	223.	218.	227.	246.	244.	237.	248.	283.	306.	276.	271.	276.	290.	279.	265.	262.	264.	268.	267.	295.	298.	290.	284.
10	268.	245.	242.	248.	273.	282.	277.	266.	286.	291.	274.	280.	999.	264.	240.	237.	247.	257.	277.	278.	267.	270.	274.	263.
11	251.	243.	264.	270.	285.	292.	280.	261.	247.	275.	307.	288.	273.	244.	264.	263.	285.	296.	294.	268.	284.	294.	262.	264.
12	241.	232.	228.	233.	274.	235.	236.	214.	209.	193.	185.	184.	198.	193.	186.	247.	245.	250.	242.	231.	236.	246.	245.	249.
13	259.	313.	309.	292.	326.	343.	1.	329.	342.	355.	44.	60.	29.	47.	62.	54.	49.	149.	154.	158.	120.	117.	93.	50.
14	42.	53.	46.	50.	45.	50.	57.	49.	45.	45.	43.	53.	27.	30.	5.	7.	25.	2.	10.	9.	2.	10.	23.	20.
15	52.	60.	61.	70.	46.	37.	23.	41.	64.	57.	84.	93.	42.	67.	75.	70.	59.	65.	50.	42.	37.	34.	39.	54.
16	24.	20.	42.	50.	53.	55.	46.	34.	32.	44.	52.	64.	42.	38.	70.	60.	38.	29.	30.	81.	136.	162.	125.	91.
17	56.	20.	260.	221.	218.	258.	314.	345.	340.	345.	337.	315.	273.	241.	254.	290.	323.	326.	288.	295.	335.	314.	283.	268.
18	273.	270.	271.	275.	275.	272.	278.	285.	286.	294.	287.	285.	285.	284.	284.	292.	295.	310.	326.	331.	338.	323.	288.	274.
19	260.	264.	266.	266.	264.	313.	315.	266.	274.	277.	260.	246.	236.	247.	264.	258.	252.	270.	232.	237.	259.	279.	292.	288.
20	271.	263.	269.	259.	269.	266.	300.	316.	327.	281.	285.	310.	300.	36.	67.	73.	69.	65.	63.	211.	221.	221.	252.	215.
21	262.	220.	246.	255.	240.	242.	233.	212.	208.	224.	216.	197.	208.	192.	78.	71.	95.	98.	52.	60.	66.	74.	74.	51.
22	55.	48.	39.	41.	64.	80.	74.	59.	349.	325.	334.	357.	335.	331.	300.	314.	336.	338.	320.	288.	277.	306.	302.	276.
23	297.	308.	319.	306.	270.	267.	265.	265.	286.	309.	258.	227.	263.	265.	256.	254.	244.	250.	250.	249.	263.	280.	267.	261.
24	253.	265.	277.	293.	296.	264.	278.	272.	270.	297.	288.	294.	320.	261.	255.	263.	250.	249.	320.	291.	298.	329.	336.	311.
25	285.	291.	10.	51.	62.	63.	63.	68.	56.	53.	75.	59.	52.	41.	8.	15.	26.	999.	999.	999.	999.	999.	999.	999.
26	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	307.	309.	320.	314.	310.	327.	293.	297.	286.	285.	281.	234.	256.	246.
27	240.	245.	249.	254.	247.	223.	210.	224.	225.	248.	243.	243.	236.	250.	241.	236.	236.	243.	251.	241.	252.	277.	291.	254.
28	270.	306.	298.	294.	278.	282.	290.	290.	281.	276.	261.	273.	299.	346.	308.	304.	303.	283.	300.	301.	275.	269.	235.	239.
29	247.	246.	247.	236.	240.	250.	252.	250.	245.	282.	284.	286.	261.	244.	241.	246.	242.	245.	243.	234.	226.	254.	255.	244.
30	252.	247.	246.	246.	259.	243.	240.	257.	235.	232.	236.	254.	284.	283.	289.	279.	312.	333.	332.	344.	332.	308.	292.	288.
31	283.	303.	289.	276.	297.	294.	287.	290.	274.	262.	265.	273.	264.	250.	229.	231.	224.	220.	230.	231.	249.	232.	216.	218.

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 726 NUMBER OF MISSING HOURS = 18 DATA CAPTURE = 97.58 (PERCENT)

THE ABOVE ROW IS DATA CAPTURE STATISTICS

NOTE : 999 - MISSING VALUE INDICATOR

888 - VARIABLE WIND DIRECTION INDICATOR 0 WIND DIRECTION INDICATES CALM CONDITION

TABLE C-25

SOUTH STATION AIR QUALITY STUDY

M TRACKS WIND SPEED (MILES PER HOUR) DATA FOR OCTOBER 1974

DAY HOURS (LST)

HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	AVG
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	7.	6.	5.	5.	4.	4.	4.	5.	4.	4.	5.	4.	4.	5.	5.	4.	3.	3.	3.	3.	2.	3.	3.	3.	4.
2	3.	5.	3.	3.	4.	4.	5.	5.	6.	7.	7.	6.	6.	6.	5.	6.	7.	8.	6.	5.	5.	5.	4.	3.	5.
3	4.	4.	4.	4.	5.	5.	4.	5.	7.	5.	6.	7.	5.	5.	5.	6.	6.	6.	5.	5.	5.	5.	4.	4.	5.
4	5.	5.	5.	4.	5.	4.	4.	5.	5.	6.	8.	6.	8.	9.	8.	8.	6.	5.	4.	5.	5.	6.	7.	7.	6.
5	6.	4.	4.	4.	5.	4.	4.	5.	5.	5.	6.	7.	9.	8.	8.	7.	8.	6.	7.	6.	6.	6.	8.	9.	6.
6	10.	9.	8.	8.	6.	5.	4.	3.	4.	5.	6.	8.	7.	7.	9.	10.	7.	6.	5.	5.	5.	8.	7.	7.	7.
7	6.	6.	6.	6.	6.	7.	8.	11.	10.	10.	11.	11.	11.	9.	8.	9.	9.	8.	7.	5.	7.	7.	6.	5.	8.
8	4.	5.	4.	5.	6.	5.	3.	4.	3.	4.	5.	5.	5.	5.	5.	5.	5.	4.	2.	3.	4.	3.	3.	2.	4.
9	3.	4.	3.	4.	3.	2.	4.	4.	4.	4.	6.	4.	5.	4.	4.	5.	5.	4.	4.	4.	4.	5.	5.	4.	4.
10	4.	4.	5.	4.	5.	4.	5.	5.	7.	8.	9.	9.	10.	10.	9.	8.	9.	5.	5.	5.	4.	5.	4.	4.	6.
11	4.	4.	5.	5.	6.	6.	5.	6.	7.	5.	4.	4.	4.	3.	3.	4.	3.	3.	4.	6.	5.	5.	6.	6.	5.
12	5.	5.	5.	6.	6.	6.	6.	10.	11.	13.	14.	15.	12.	10.	11.	10.	10.	9.	8.	7.	6.	6.	7.	6.	9.
13	3.	5.	6.	6.	6.	5.	5.	5.	7.	7.	6.	6.	6.	7.	6.	5.	3.	3.	3.	3.	2.	4.	4.	3.	5.
14	2.	2.	3.	3.	2.	2.	2.	2.	3.	4.	5.	7.	8.	10.	10.	11.	9.	8.	7.	9.	11.	13.	12.	10.	6.
15	10.	9.	9.	10.	8.	8.	9.	10.	13.	14.	14.	13.	9.	9.	10.	8.	8.	6.	5.	4.	3.	3.	3.	3.	6.
16	3.	5.	5.	5.	7.	6.	8.	8.	8.	9.	9.	8.	9.	9.	12.	13.	10.	8.	6.	5.	5.	4.	4.	4.	7.
17	4.	4.	5.	5.	4.	3.	3.	3.	3.	4.	6.	8.	7.	9.	9.	9.	10.	8.	8.	8.	9.	9.	9.	7.	6.
18	7.	7.	7.	7.	7.	7.	6.	7.	7.	7.	8.	7.	6.	7.	7.	6.	6.	6.	4.	5.	4.	4.	4.	4.	6.
19	5.	5.	5.	5.	4.	5.	5.	4.	4.	5.	4.	5.	4.	6.	5.	4.	4.	4.	4.	4.	4.	6.	5.	5.	5.
20	4.	4.	4.	4.	5.	5.	5.	4.	6.	7.	6.	7.	7.	7.	8.	6.	6.	7.	7.	6.	6.	7.	6.	5.	6.
21	4.	4.	4.	4.	4.	4.	5.	5.	7.	6.	6.	7.	6.	6.	6.	6.	6.	5.	4.	4.	3.	5.	6.	6.	5.
22	6.	6.	6.	6.	7.	8.	6.	9.	9.	10.	11.	11.	10.	10.	9.	9.	8.	7.	6.	7.	7.	7.	8.	9.	8.
23	6.	7.	5.	3.	4.	4.	5.	5.	4.	4.	5.	5.	6.	6.	5.	5.	5.	4.	3.	3.	4.	3.	3.	4.	5.
24	4.	5.	5.	5.	3.	3.	5.	5.	6.	5.	5.	7.	5.	5.	4.	5.	5.	5.	5.	4.	5.	5.	6.	5.	5.
25	5.	7.	7.	6.	5.	6.	8.	7.	11.	15.	14.	14.	14.	12.	9.	8.	6.	6.	6.	7.	8.	9.	10.	9.	9.
26	7.	6.	6.	4.	5.	7.	6.	7.	8.	8.	7.	8.	7.	8.	10.	9.	8.	8.	8.	8.	9.	10.	10.	9.	8.
27	8.	7.	6.	9.	10.	8.	8.	6.	9.	8.	7.	6.	6.	6.	6.	6.	5.	3.	4.	4.	5.	5.	5.	4.	6.
28	3.	3.	3.	4.	3.	3.	2.	4.	4.	4.	5.	5.	7.	6.	7.	5.	8.	6.	6.	7.	5.	5.	5.	5.	5.
29	4.	4.	4.	4.	3.	4.	4.	7.	9.	9.	9.	12.	11.	9.	9.	9.	8.	6.	8.	8.	7.	6.	7.	6.	7.
30	6.	5.	5.	6.	5.	4.	5.	6.	5.	5.	4.	4.	4.	3.	5.	5.	6.	5.	4.	4.	3.	3.	4.	4.	5.
31	3.	2.	4.	8.	5.	4.	6.	7.	7.	6.	8.	6.	7.	8.	6.	7.	6.	7.	7.	6.	7.	8.	8.	7.	7.
	5.	5.	5.	5.	5.	5.	5.	6.	7.	7.	7.	8.	7.	7.	7.	7.	7.	6.	5.	5.	5.	6.	6.	5.	
	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	31.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 744 NUMBER OF MISSING HOURS = 0 DATA CAPTURE = 100.00 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 6.030 MAXIMUM HOURLY VALUE = 15.000MAXIMUM VALUE OCCURED ON DAY 12 , HOUR ENDING 12

TABLE C-26

SOUTH STATION AIR QUALITY STUDY

M TRACKS　　WIND SPEED (MILES PER HOUR)　　DATA FOR NOVEMBER 1974

DAY	HOURS (LST)																								AVG
HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	7.	7.	7.	7.	7.	7.	6.	8.	9.	6.	10.	10.	10.	10.	8.	9.	9.	6.	6.	7.	7.	5.	5.	5.	8.
2	3.	2.	3.	3.	3.	4.	4.	5.	4.	4.	4.	5.	5.	5.	4.	4.	3.	3.	2.	2.	3.	4.	4.	4.	4.
3	4.	4.	4.	3.	3.	4.	3.	3.	4.	5.	6.	4.	5.	3.	3.	3.	3.	3.	2.	2.	2.	3.	4.	6.	4.
4	5.	3.	3.	3.	5.	5.	6.	8.	8.	8.	7.	6.	5.	6.	5.	4.	4.	3.	3.	4.	5.	3.	4.	3.	5.
5	5.	6.	9.	6.	9.	7.	9.	8.	6.	7.	7.	6.	6.	7.	7.	8.	8.	7.	7.	6.	7.	5.	4.	5.	7.
6	5.	4.	4.	4.	4.	3.	3.	3.	4.	5.	5.	4.	4.	3.	4.	4.	6.	5.	4.	5.	4.	3.	3.	2.	4.
7	3.	4.	4.	4.	4.	4.	5.	5.	5.	5.	3.	6.	8.	7.	7.	7.	6.	6.	6.	7.	6.	6.	7.	6.	5.
8	5.	5.	5.	4.	5.	5.	5.	6.	9.	6.	6.	6.	7.	6.	6.	5.	4.	5.	5.	5.	5.	5.	5.	4.	6.
9	5.	7.	7.	6.	6.	5.	4.	5.	5.	6.	6.	7.	9.	10.	8.	7.	4.	4.	4.	5.	5.	4.	5.	4.	6.
10	4.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	6.	6.	5.	4.	4.	2.	1.	3.	4.	2.	1.	1.	2.	4.
11	4.	4.	4.	4.	3.	4.	2.	2.	4.	5.	5.	5.	5.	5.	5.	5.	6.	7.	7.	6.	5.	5.	5.	5.	5.
12	5.	4.	4.	6.	6.	9.	9.	9.	10.	9.	6.	7.	7.	7.	8.	8.	8.	9.	10.	9.	9.	10.	10.	10.	8.
13	8.	9.	10.	8.	5.	4.	9.	14.	15.	16.	15.	13.	15.	10.	8.	8.	9.	8.	9.	8.	8.	7.	7.	7.	10.
14	8.	6.	5.	4.	2.	3.	3.	4.	5.	6.	11.	12.	13.	13.	12.	11.	9.	8.	7.	7.	7.	7.	7.	6.	7.
15	7.	7.	7.	6.	5.	7.	6.	8.	9.	10.	10.	9.	10.	9.	9.	8.	8.	7.	7.	8.	8.	8.	8.	9.	8.
16	10.	9.	8.	8.	9.	9.	10.	10.	12.	12.	11.	10.	10.	10.	10.	9.	9.	8.	7.	7.	7.	8.	7.	8.	9.
17	9.	9.	9.	6.	7.	5.	5.	5.	5.	6.	7.	7.	7.	6.	6.	6.	5.	6.	4.	3.	6.	6.	4.	8.	6.
18	5.	6.	7.	7.	6.	7.	6.	7.	7.	10.	11.	13.	12.	9.	10.	9.	8.	6.	6.	5.	4.	5.	5.	3.	7.
19	3.	3.	4.	5.	4.	3.	3.	5.	4.	3.	2.	3.	5.	6.	5.	4.	5.	5.	4.	3.	2.	2.	3.	2.	4.
20	2.	3.	3.	2.	2.	3.	3.	1.	1.	1.	3.	3.	3.	3.	3.	3.	3.	3.	3.	5.	3.	1.	2.	2.	3.
21	3.	5.	3.	4.	5.	7.	8.	9.	10.	12.	11.	10.	12.	13.	11.	12.	11.	9.	9.	6.	6.	5.	5.	7.	8.
22	6.	7.	6.	6.	6.	5.	6.	5.	5.	4.	4.	5.	7.	7.	6.	7.	5.	4.	6.	6.	5.	5.	5.	6.	6.
23	5.	5.	5.	2.	4.	4.	4.	4.	2.	2.	[illegible]	2.	4.	3.	3.	3.	2.	4.	5.	5.	7.	6.	6.	5.	4.
24	7.	7.	6.	7.	7.	10.	9.	9.	10.	9.	10.	13.	12.	11.	10.	10.	10.	10.	10.	7.	6.	6.	5.	6.	9.
25	7.	7.	7.	6.	6.	5.	5.	6.	6.	5.	7.	6.	7.	6.	6.	5.	5.	6.	7.	7.	5.	6.	6.	7.	6.
26	7.	7.	7.	8.	6.	6.	7.	9.	10.	10.	11.	10.	10.	9.	9.	10.	10.	10.	11.	12.	11.	11.	11.	10.	9.
27	11.	12.	11.	11.	9.	10.	11.	12.	10.	10.	11.	9.	9.	9.	6.	8.	7.	7.	8.	7.	6.	5.	4.	4.	9.
28	4.	3.	4.	4.	3.	4.	3.	4.	5.	5.	4.	3.	4.	4.	5.	4.	3.	2.	4.	4.	3.	4.	3.	5.	4.
29	4.	4.	5.	4.	4.	4.	4.	4.	5.	5.	6.	5.	6.	5.	5.	5.	4.	3.	4.	4.	4.	6.	6.	5.	5.
30	4.	5.	5.	4.	5.	4.	4.	4.	5.	5.	5.	5.	6.	5.	5.	6.	6.	5.	5.	5.	4.	4.	3.	4.	5.
	6.	5.	6.	5.	5.	5.	6.	6.	7.	7.	7.	7.	8.	7.	7.	7.	6.	6.	6.	6.	5.	5.	5.	5.	
	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	

TOTAL HOURS = 720　NUMBER OF GOOD HOURS = 720　NUMBER OF MISSING HOURS = 0　DATA CAPTURE = 100.00 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 6.040　MAXIMUM HOURLY VALUE = 16.000MAXIMUM VALUE OCCURED ON DAY 13 , HOUR ENDING 10

TABLE C-27

SOUTH STATION AIR QUALITY STUDY

M TRACKS WIND SPEED (MILES PER HOUR) DATA FOR DECEMBER 1974

HOURS (LST)

DAY HR-BEG	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	AVG
HR-END	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	8.	7.	6.	6.	5.	5.	4.	4.	4.	5.	6.	6.	6.	8.	9.	9.	9.	9.	10.	10.	11.	12.	13.	14.	8.
2	16.	17.	17.	18.	18.	19.	23.	28.	29.	26.	22.	12.	10.	9.	8.	7.	7.	7.	9.	8.	8.	6.	6.	7.	14.
3	4.	6.	5.	5.	5.	6.	8.	8.	9.	11.	11.	10.	8.	8.	6.	8.	8.	9.	10.	9.	9.	9.	9.	8.	8.
4	8.	8.	8.	6.	6.	10.	10.	9.	9.	9.	10.	13.	10.	9.	7.	6.	7.	7.	8.	8.	9.	9.	8.	5.	8.
5	5.	4.	4.	4.	4.	5.	5.	6.	6.	6.	7.	6.	5.	5.	5.	5.	4.	4.	5.	4.	5.	3.	4.	4.	5.
6	5.	5.	4.	3.	4.	5.	5.	4.	5.	5.	5.	5.	7.	6.	6.	5.	5.	5.	3.	5.	5.	4.	4.	4.	5.
7	5.	4.	4.	3.	4.	3.	2.	2.	2.	3.	2.	3.	6.	5.	5.	5.	5.	5.	2.	1.	1.	1.	2.	1.	3.
8	2.	3.	5.	4.	5.	6.	6.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.
9	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	8.	9.	11.	8.	7.	999.
10	7.	8.	6.	8.	7.	8.	7.	7.	10.	10.	12.	11.	999.	10.	10.	9.	8.	8.	9.	9.	8.	8.	8.	8.	9.
11	8.	7.	7.	7.	7.	8.	7.	6.	7.	8.	8.	7.	5.	6.	7.	7.	6.	9.	9.	10.	8.	7.	6.	7.	7.
12	4.	3.	4.	4.	5.	4.	4.	4.	3.	3.	4.	4.	2.	5.	6.	9.	7.	9.	10.	6.	6.	6.	9.	6.	5.
13	5.	5.	5.	7.	6.	5.	3.	3.	4.	5.	5.	5.	4.	5.	6.	5.	5.	3.	2.	3.	6.	5.	5.	5.	5.
14	4.	5.	5.	6.	7.	8.	9.	7.	5.	4.	5.	5.	6.	6.	6.	5.	7.	7.	6.	6.	6.	6.	6.	5.	6.
15	4.	4.	5.	5.	5.	5.	5.	5.	6.	6.	7.	8.	6.	7.	6.	5.	6.	6.	6.	8.	7.	4.	6.	7.	6.
16	4.	4.	5.	5.	5.	4.	6.	7.	10.	10.	9.	8.	6.	8.	9.	10.	12.	14.	16.	17.	14.	12.	14.	9.	9.
17	5.	5.	7.	6.	6.	10.	12.	10.	12.	14.	11.	8.	6.	10.	13.	12.	10.	9.	9.	9.	9.	8.	8.	9.	9.
18	7.	8.	6.	7.	7.	5.	4.	6.	10.	12.	12.	11.	13.	12.	13.	12.	11.	10.	12.	12.	11.	12.	11.	11.	10.
19	9.	8.	6.	9.	9.	11.	11.	12.	10.	8.	9.	10.	10.	9.	9.	9.	9.	8.	6.	6.	7.	7.	7.	7.	9.
20	5.	8.	9.	10.	10.	10.	9.	7.	8.	9.	9.	7.	5.	8.	8.	8.	7.	5.	4.	4.	4.	4.	7.	5.	7.
21	5.	5.	5.	5.	4.	3.	1.	1.	1.	2.	1.	2.	4.	3.	4.	4.	5.	6.	5.	5.	4.	7.	7.	5.	4.
22	7.	6.	6.	9.	4.	5.	6.	6.	6.	7.	6.	5.	5.	7.	6.	6.	4.	4.	4.	6.	9.	8.	9.	7.	6.
23	6.	7.	7.	7.	9.	7.	7.	11.	15.	11.	8.	9.	11.	14.	12.	11.	7.	10.	8.	8.	7.	9.	9.	7.	9.
24	9.	10.	10.	6.	7.	7.	6.	6.	7.	9.	7.	6.	6.	5.	4.	5.	5.	2.	2.	3.	5.	8.	7.	5.	6.
25	4.	4.	5.	5.	4.	3.	4.	3.	4.	3.	3.	2.	3.	3.	6.	7.	6.	999.	999.	999.	999.	999.	999.	999.	999.
26	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	999.	7.	6.	5.	5.	6.	6.	6.	5.	5.	5.	5.	5.	999.
27	6.	6.	7.	6.	7.	7.	7.	7.	7.	10.	12.	10.	11.	10.	8.	6.	6.	6.	6.	5.	6.	6.	5.	5.	7.
28	6.	6.	5.	4.	5.	3.	3.	2.	3.	5.	6.	5.	8.	5.	7.	5.	3.	3.	2.	3.	3.	4.	4.	4.	4.
29	5.	5.	4.	4.	5.	6.	5.	5.	7.	7.	4.	5.	6.	6.	5.	5.	6.	7.	7.	7.	8.	9.	8.	7.	6.
30	7.	7.	7.	7.	7.	8.	7.	6.	8.	6.	7.	5.	7.	10.	10.	8.	7.	7.	6.	5.	5.	5.	3.	4.	7.
31	6.	7.	5.	4.	4.	4.	3.	4.	4.	5.	3.	3.	5.	7.	7.	7.	6.	6.	8.	7.	10.	4.	3.	3.	5.
	6.	6.	6.	6.	6.	7.	7.	7.	8.	8.	8.	7.	7.	7.	7.	7.	7.	7.	7.	7.	7.	7.	7.	6.	
	29.	29.	29.	29.	29.	29.	29.	28.	28.	28.	28.	28.	28.	29.	29.	29.	29.	28.	28.	29.	29.	29.	29.	29.	

TOTAL HOURS = 744 NUMBER OF GOOD HOURS = 688 NUMBER OF MISSING HOURS = 56 DATA CAPTURE = 92.47 (PERCENT)

ABOVE THREE ROWS ARE TOTAL HOURLY AVERAGES, TOTAL OBSERVATIONS/HOUR, AND DATA CAPTURE STATISTICS, RESPECTIVELY

TOTAL AVERAGE = 6.807 MAXIMUM HOURLY VALUE = 29.000MAXIMUM VALUE OCCURED ON DAY 2 , HOUR ENDING 9

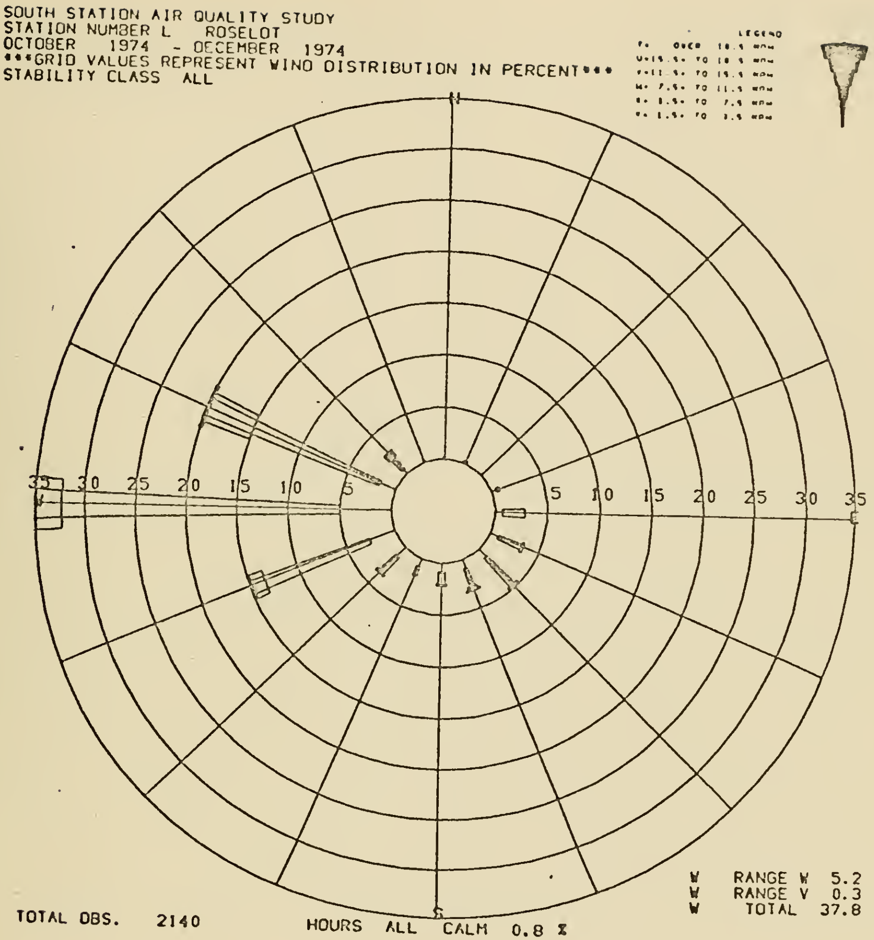


Figure C-4 Wind Rose Derived from South Station Monitoring Program at Roselot Site - Station L - Oct. - Dec. 1974

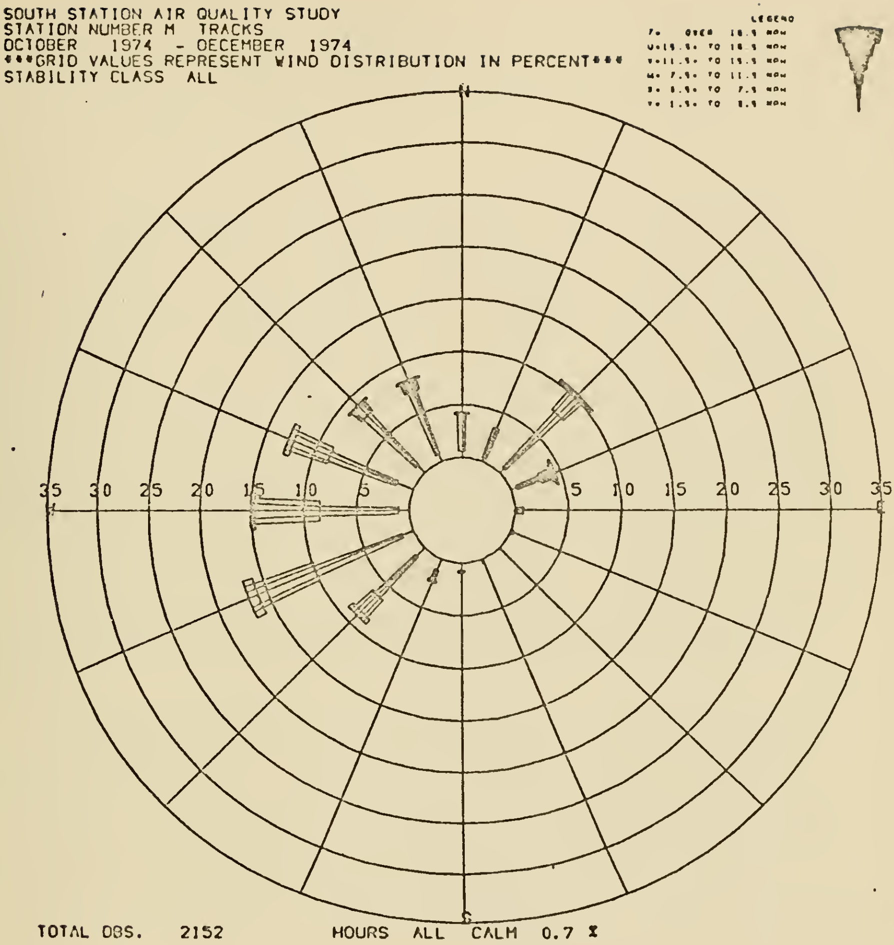


Figure C-5 Wind Rose Derived from South Station Monitoring Program at Tracks Site - Station M - Oct. - Dec. 1974

APPENDIX D

APPLICATION OF DISPERSION MODELING TO ASSESS CO AIR QUALITY IMPACT

D.1 Urban Diffusion Meteorology

The transport and diffusion of pollutants emitted into the ambient air from a given source are governed primarily by the dynamical and thermal structure of the atmospheric layer adjacent to the ground. The intensity of local turbulence and local horizontal and vertical wind flow patterns are responsible for dispersing the pollutants originating from a pollutant source region such as a roadway. Studies of the spatial and temporal distributions of pollutants must, therefore, take into account the statistics of several meteorological elements including wind speed, wind direction, and the stability of the lower atmosphere. The specification of stability is an indirect measure of turbulence.

The stability of the lower atmosphere may be divided into three major categories: unstable, neutral, and stable. The effects of each of these conditions on the dispersion of contaminants is described below.

Field measurements and diffusion studies have shown that during stable conditions vertical motions are inhibited. Stable atmospheric conditions are often associated with an increase of temperature with height; that is, a temperature inversion. Any pollutant emitted at the ground tends to remain near the ground under conditions of reduced vertical turbulent motions, while effluents emitted within or above the stable layer are not mixed to the ground rapidly, and, therefore, do not contribute significantly to ground-level concentrations. It should be noted that the automobile, travelling on at-grade roadways, is generally considered a ground-level pollutant source and, therefore, stable atmospheric conditions normally present the worst potential for high short-term pollutant concentrations resulting from vehicular emissions. Conversely, unstable conditions tend to enhance vertical motions. The result is the enhancement of turbulence and thorough mixing of the lower atmosphere. These conditions cause rapid diffusion of any pollutant emitted into the atmosphere. The third stability category, neutral, occurs quite frequently and is often associated with high winds and

mechanically-induced turbulence, also causing good mixing of the emitted pollutants.

Diffusion meteorology in urban areas is significantly different from that of the rural areas surrounding it, and an increasing amount of scientific research has been devoted to comparative studies of urban and rural climates. The urban area introduces two modifying effects to the local meteorology. First is the increased turbulence and frictional drag imparted by the tall, irregularly spaced obstacles. Second, is the increased surface temperature due to the "heat island effect" discussed in Section 1.5 and its subsequent influence on atmospheric stability. In general, unstable conditions will occur in urban areas if unstable conditions exist in the open, rural areas. Inversions within a city are not likely at night, and will be less well-developed. A strong inversion in rural areas resulting from light winds and clear skies is usually accompanied by neutral stability conditions in the inner city. For overcast conditions and high winds, neutral stability both inside and outside of the city results from the elimination of the temperature differential. Therefore, urban stability is generally limited to the range of neutral to unstable, while the rural areas experience a range from stable to unstable. Chandler (1965)(20) found that during clear, calm nights the higher levels of turbulence in urban areas, and the tendency for greater instability, results in higher wind speeds then in the stable rural regions. During clear days, however, when the rural regions also experience instability, the larger frictional drag of the city becomes important, resulting in lower wind speeds in the urban areas.

D.2 The Street Canyon Phenomenon

In the urban complex, pollutant concentrations are a function of the urban configuration, specifically street width and building height, the mixing and dispersive properties of the atmosphere in the street channel and roof-top boundary layer, as well as time-varying factors such as local traffic patterns. Comprehensive full-scale field studies by Georgii, Busch, and Weber (1967) in Frankfurt, Germany,(21) and Johnson, Dabberdt, Ludwig, and Allen (1971) in San Jose, California,(22) provide valuable field data of the flow fields and concentration patterns

in typical city streets. Wind tunnel experiments conducted by Hoydysh and Ogawa (1972)(23) and Hoydysh, Griffiths, and Ogawa (1974)(24) showed dispersion phenomena similar in their gross features to those observed in Georgii's and Johnson's field experiments.

For a long street with buildings of nearly uniform height on each side, the highest pollutant concentrations were found when the wind direction was perpendicular to the street canyon, since ventilation of the street-level line source is impeded. The expected air circulation pattern, a helical channel vortex flow, is shown in Figure D-1. The field experiments showed that under these conditions the concentrations were higher on the leeward surface than on the windward surface (see Figure D-2). Also the field investigations indicated that there was a direct relationship between concentration and roof-top wind velocity. The general decrease in the CO concentration with increasing wind velocity above the roof-top is shown in Figures D-2 and D-3. At wind speeds between 2 and 3 m/sec, however, Georgii observed an increase in concentration with increasing wind speed. It is assumed that this resulted from a change in the character of the channel vortex. Possibly, the channel vortex flow is not fully organized below speeds of about 2 m/sec. This jump in concentration between 2 and 3 m/sec was not observed in the wind tunnel study (see Figure D-4).

Flow parallel to the street canyon does not result in a vortex flow, but rather in a laterally bounded channel flow. This well-mixed situation will almost certainly lead to lower concentrations than observed with a perpendicular flow, and indeed, this was verified by the San Jose field experiments.

D.3 Description of Air Quality Prediction Models

The transport and diffusion of pollutants emitted into the ambient air are governed by the meteorological characteristics of the atmospheric boundary layer adjacent to the ground. Two elements, the intensity of turbulent mixing of pollutants and the horizontal and vertical wind flow, are chiefly responsible for dispersing pollutants from roadway sources. The Egan-Mahoney numerical advection-diffusion model EGAMA has been adapted to simulate the channel vortex flow in urban

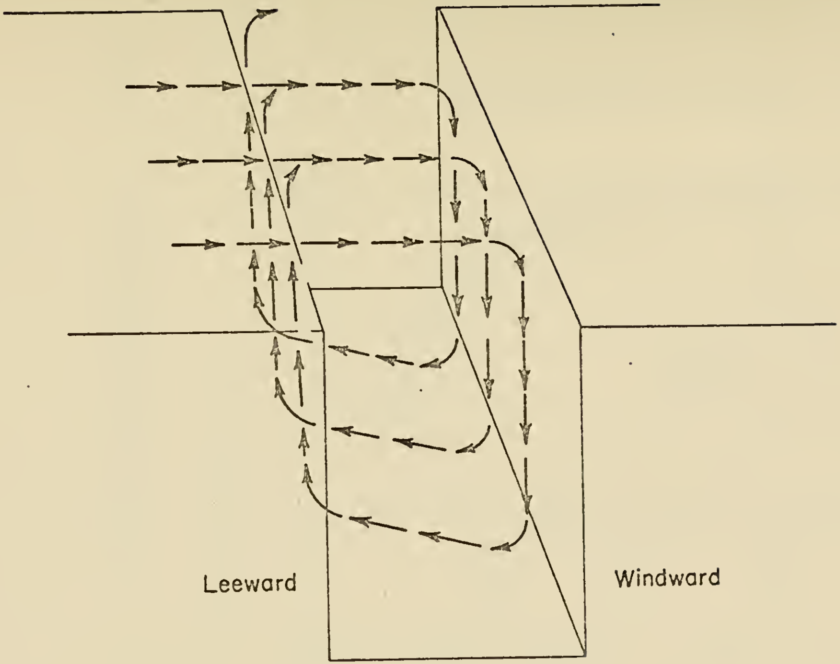


Figure D-1 Schematic of Expected Street Canyon Flow Pattern for Perpendicular Roof-top Wind

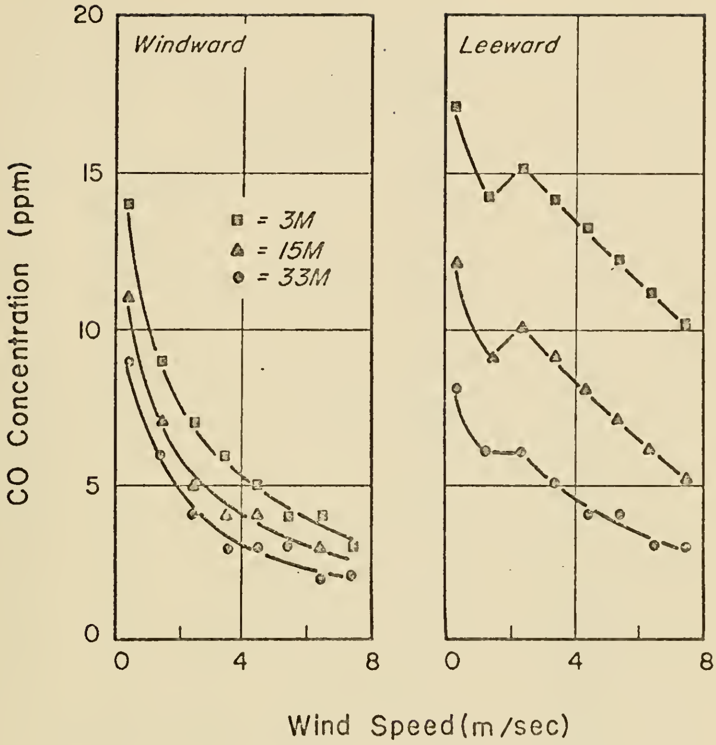


Figure D-2 Vertical Distribution of Observed CO Concentration at Various Wind Velocities (after Georgii)

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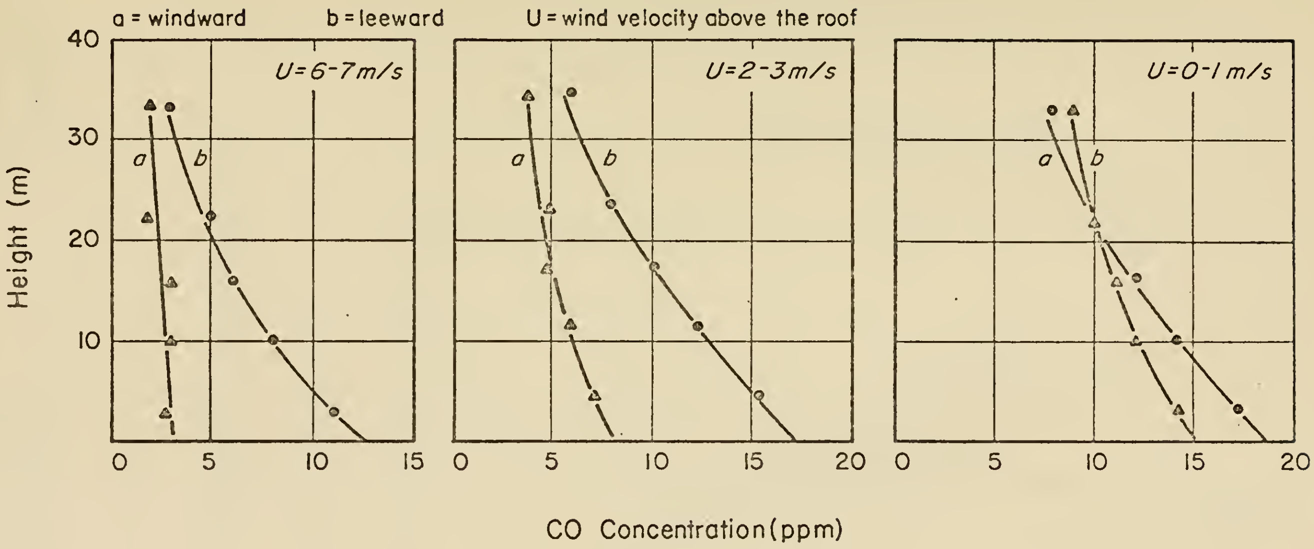

Figure D-3 Observed CO Concentration at Various Heights as a Function of Roof-top Wind Velocity (after Georgii)

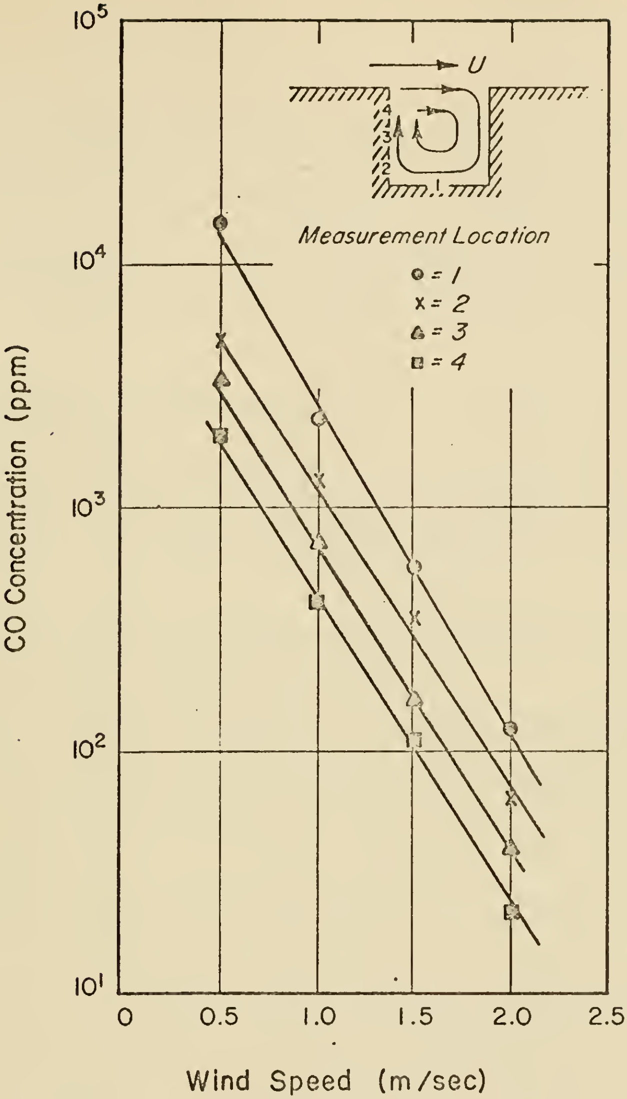

Figure D-4 Observed CO Concentration Variation with Wind Velocity in Two-dimensional Wind Tunnel Experiment (after Hoydysh)

street canyons. This model incorporates the capability of treating spatially varying winds (both horizontal and vertical) and diffusivities. A general discussion of the EGAMA model is presented in the following section (D.3.1) with an explanation of the street canyon adaptation of EGAMA in Section D.3.2. A description of the integrated area source model used in the parallel wind analyses concludes this section.

D.3.1 EGAMA, Egan - Mahoney Advection - Diffusion Model

The physical configuration of a roadway, which determines the micrometeorological flow field and the resulting dispersion rates of vehicular emissions, has a fundamental effect on the magnitude of its air quality impact. This flow field is characterized by:

- substantial initial mixing of vehicular emissions within the aerodynamic wake region of the vehicle
- significant spatial variations of the wind and diffusivity fields resulting from obstructions to wind flow (regions of systematic reverse eddy flow can generally be expected)
- turbulent mixing rates varying as a function of height above the ground
- horizontal wind speeds generally increasing with height.

EGAMA, a numerical advection-diffusion simulation model based upon a conservation of mass equation, incorporates these micrometeorological flow characteristics and represents the current state-of-the-art in roadway dispersion modeling. The EGAMA model was extensively validated at six highway sites in Washington, D.C. Carbon monoxide measurements were taken on both sides of the roadways and at three heights along with concurrent meteorological measurements and traffic observations (to estimate CO emissions). Several hundred hours of CO concentrations, emissions, and meteorological data were measured for the validation purpose. It was found that the model adequately (within 20%) predicts CO values (Egan, et.al., 1973) for elevated, depressed (open cut), and at-grade roadways. The computer output provides the near field (less

than 200-300 meters) pollutant concentration values as a function of downwind distance and height. This allows the determination of air quality at ground-level and elevated receptors (e.g., building air intakes).

The following discussion is a brief theoretical presentation of the model and its microscale grid system. Further discussion of the model's application may be found in the papers by Egan and Lavery (1973)(25,26).

The advection and diffusion of a pollutant are governed by the tracer equation. This two-dimensional equation describing the change in concentrations resulting from horizontal advection, vertical advection, vertical diffusion, and source emission is

$$\frac{\partial \chi}{\partial t} = -U \frac{\partial \chi}{\partial x} - W \frac{\partial \chi}{\partial z} + \frac{\partial}{\partial z} (K \frac{\partial \chi}{\partial z}) + Q(x,z) \qquad \text{(D-1)}$$

where

(x,z) are the downwind and vertical coordinates (meters) in a two-dimensional Cartesian system

$\chi(x,z)$ is the concentration of the particular pollutant (mg/m^3)

t is the time (seconds)

$U(x,z)$ is the horizontal wind speed (m/sec)

$W(x,z)$ is the vertical wind speed (m/sec)

$K(x,z)$ is the turbulent diffusivity (m^2/sec) and

$Q(x,z)$ is the source emission rate (mg/m^3/sec)

To simulate pollutant dispersion across and downwind of a roadway, a vertical cross-sectional region enclosing the roadway is divided into a number of grid elements, and the partial derivatives in the tracer equation are approximated by finite differences corresponding to the dimensions of the two-dimensional grid elements. The finite-difference simulation for horizontal advection, vertical advection and vertical mixing in the governing equation is performed in three separate, sequential steps in the computational procedure.

If the horizontal dimensions of the grid elements are set equal to the width of a road lane and the vertical dimensions equal to a mean

initial mixing depth of the aerodynamic wake region of a vehicle, traffic in different lanes can then be represented by volume source emission rates in the corresponding grid elements. Boundary conditions and initial values of the concentration field need to be specified for the grid cell representation. For most applications, the initial values of the concentration field are equal to zero; and similarly, the upwind (left) boundary values are set equal to zero. The steady-state solution is then generated. However, current pollution levels and upwind background levels can be used as initial values and boundary values for special situations.

Conventional finite-difference approximations in the two advection terms, $U\partial\chi/\partial x$ and $W\partial\chi/\partial z$, produce truncation errors which, in effect, introduce numerical "pseudo-diffusion" errors into the predicted quantities. This artificial upwind and downwind mixing rate of the material by the numerical scheme can be orders of magnitude larger than that resulting from the true atmospheric mixing process.

The pseudo-diffusion associated with the numerical advection term can be substantially reduced by utilization of one or more statistical moments of the concentration distribution within the grid element in the computation scheme. This model, therefore, provides an important improvement in the accuracy of simulating pollutant transport numerically in the near field of roadways.

The vertical diffusion component, $\partial/\partial z\ (K\partial\chi/\partial z)$, is simulated by a conventional forward-time, centered-difference technique modified so that variable vertical grid spacing can be specified. In regions where parameters or concentrations change rapidly with height, resolution and accuracy can be improved with smaller vertical grid spacing. In other regions (typically at high altitudes) where gradients are smaller, large grid spacings can be used.

Both the horizontal wind speed, $U(x,z)$, and vertical wind speed, $W(x,z)$, are calculated on the basis of conservation of mass and according to the "topography" in the grid system. A simple power law expression for U is assumed to be valid at the left boundary, i.e., $U(x = 0,z) = U_1(z/z_1)^\alpha$, where

U_1 is a measured wind speed

z_1 is the height at which U_1 is measured, and

α is an externally imposed parameter depending on atmospheric stability conditions.

For computational purposes the wind direction is always perpendicular to the highway. To simulate the effect on concentrations of winds at small azimuth angles ($\theta = 0$ with perpendicular winds), the model reduces the wind speed in the advection terms by a factor of $\cos \theta$. The modification in essence simulates the effects of oblique wind angles on increasing the travel time of pollutants to corresponding positions normal to the roadway. The procedure is valid for θ less than about 67.5 degrees.

The wind fields for different obstacle configurations are calculated by assuming that various horizontal velocity profile modifications will result from the presence of obstacles to the flow and by requiring that the wind fields that result satisfy conservation of mass at each grid element. The fields calculated in this general EGAMA simulation are expected to be valid for typical roadway cross-sections where the roadway width is large with respect to the depression depth.

D.3.2 CANYON, Street Canyon Flow Submodel

As discussed in Section D.2, the channel vortex flow is a very complex phenomenon. Both field studies and wind tunnel experiments indicate that for roof-top flow perpendicular to the street canyon:

1) A secondary vortex flow is induced in the obstructed sublayer by winds passing above the street canyon.

2) A strong shear stress layer develops just above the mean roof plane, while stress within the canyon is nearly constant.

3) The leeward building surface concentrations are almost always higher than the windward concentrations.

4) There is a general decrease in pollutant concentrations in the canyon with increasing roof-top wind speed.

Under the constraints of a limited experimental data base and the need for repeated model applications, a simple two-dimensional model, yet one that retains the basic physical principles and gross features of the channel vortex flow, has been developed. Following Hotchkiss and Harlow (1973)(27), the street canyon flow is idealized as the two-dimensional vortex solution to a cross-wind passing over the top of a simple notch. This is assumed valid for perpendicular roof-top flow over a long canyon formed by buildings of approximately equal height. Hotchkiss et. al. derived an approximate solution for the horizontal velocity component, U

$$U = \frac{U_o}{1-\beta} \left[e^{kz}(1 + kz) - \beta e^{-kz}(1 - kz)\right] \sin kx \qquad \text{(D-2)}$$

where

U = the horizontal velocity component

U_o = speed of the external flow at all points above the notch

$\beta = e^{-2kH}$

$k = \frac{\pi}{L}$

L = the width of the notch

H = the depth of the notch

x = the horizontal coordinate ($x = 0$ at the upper left corner of the notch and increases to the right), and

z = the vertical coordinate ($z = 0$ at the upper left corner of the notch and increases toward the bottom of the notch)

The vertical velocity field is computed from conservation of mass.

From equation (D-2), several aspects of the flow field are readily apparent.

(1) The flow field is solely a function of the height and width of the notch and the external (roof-top) wind speed.

(2) The horizontal profile is sinusoidal, with the maximum horizontal speed at the top of the notch equal to the speed of the external flow.

(3) The velocity of the vortex is directly proportional to the speed of the external flow.

(4) The depth of the vortex center (the depth at which the horizontal velocity is zero) varies with the height to width ratio $(\frac{H}{L})$ of the notch. Its horizontal position is always $\frac{L}{2}$.

The changing location of the vortex center over the continuous range of canyon geometries is displayed in Figure D-5. For tall buildings or a narrow street $(\frac{H}{L} \geq 4)$, the center of the vortex flow is just below the roof plane. Ground-level velocities and the resulting pollutant dispersion would be negligible in this case, which represents an extremely deep canyon. At the other extreme $(\frac{H}{L} \geq 1/2)$ - short buildings or a wide street - the vortex center is deep in the canyon. The limit of applicability occurs for a street width about three times the building height $(\frac{H}{L} \geq 1/3)$. For $(\frac{H}{L})$ ratios less than 1/3, the street canyon option is replaced by the normal EGAMA situation.

A limited verification of the location of the vortex center can be obtained from Hoydysh's (1972, 1974) wind tunnel results for canyons with $\frac{H}{L} = 1$. Hoydysh found that the vortex center is located at a depth of about 1/3 the total canyon depth. This source configuration $(\frac{H}{L} = 1)$ when simulated with our idealized flow field yields the nearly identical fractional depth of 0.31.

The eddy coefficients of diffusivity are computed by EGAMA as a function of roof-top wind speed and stability. Over level terrain (e.g., above the mean roof plane) they are usually expressed as a simple power function with height. Within the canyon, the eddy diffusivity was assumed constant and equal to that value computed by EGAMA just above the mean roof plane. In the external flow field (above the canyon) the simple power law form is followed.

Since the wind tunnel simulates a neutral environment, the model has been applied using neutral stability only. The San Jose field studies indicate that this is probably a good assumption. They showed little relation between observed CO concentrations and the atmospheric lapse rate. This probably reflects the dominance of mechanical mixing by flow obstructions and the motion of vehicles as compared to convective mixing.

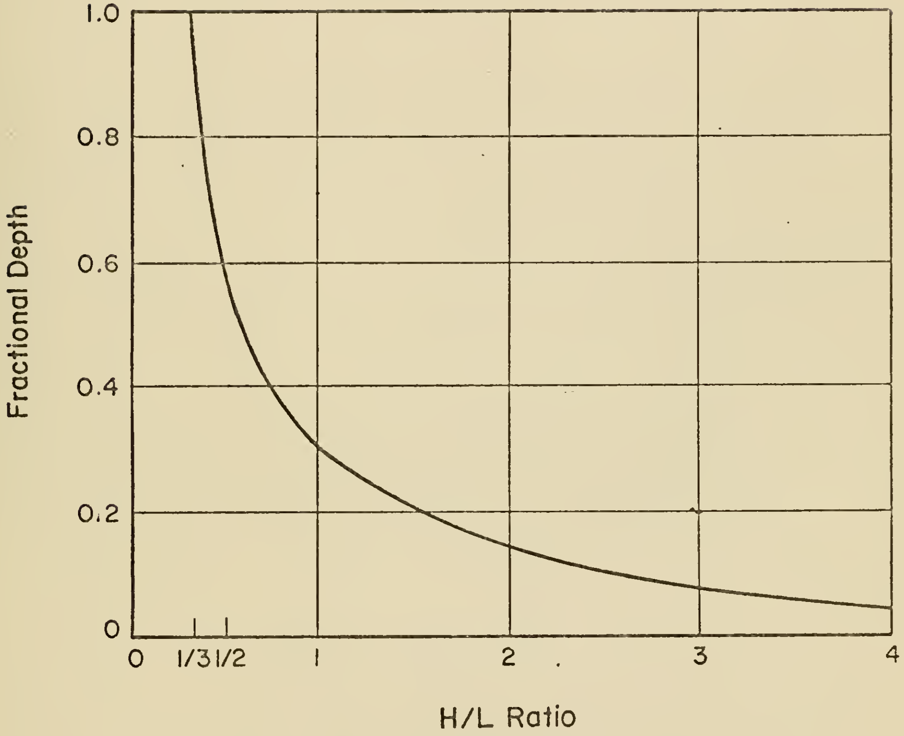

Figure D-5 Fractional Depth of Two-dimensional Vortex Center as a Function of Depth to Width Ratios

The street canyon model was validated using the data collected by field studies in San Jose, California. Johnson classed and averaged his total concentration and flow field data by the eight 45° roof-top wind sectors. Four of these wind sectors (north, east, south and west) were perpendicular to the two cross streets in the field study. Of these four available wind sectors half (north and west) were used to validate the street canyon model.

Figure D-6 shows the predicted concentration field and the accompanying average observed concentrations (in parentheses) for a westerly roof-top wind of 1.0 m/sec. The two observation stations are located far enough from intersections to allow a vortical circulation to dominate the local flow field and justify comparison with the two-dimensional model. Given the simplicity of the assumed model flow field and the use of estimated traffic emissions, the concentration fields agree remarkably well. The predicted cross-street CO gradient is larger than observed, but only by a factor of 1.5. The vertical CO gradients are in even closer agreement. In the same manner the concentration fields of Figure D-7 for a northerly roof-top wind of 1.4 m/sec can be compared. Not enough observational data is available to accurately validate the cross-street concentration gradient. The vertical gradients agree well.

It was found that the predicted concentrations very nearly obeyed the inverse relation.

$$\chi(x,z) = \chi_o(x,z) \frac{U_o}{U}$$

where χ_o and U_o are some reference pollutant concentration and roof-top wind speed, respectively. Thus, the concentration fields predicted by the street canyon model can be linearly scaled to any roof-top wind speed.

D.3.3 Area Source Model

The third model used in this study was a simplified integrated area source model derived from the work of Gifford and Hanna (1971). It was used to simulate the CO concentration resulting from wind blowing parallel to a roadway alignment. The model can be represented by the following equation:

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Concentration Field Predicted by CANYON Model

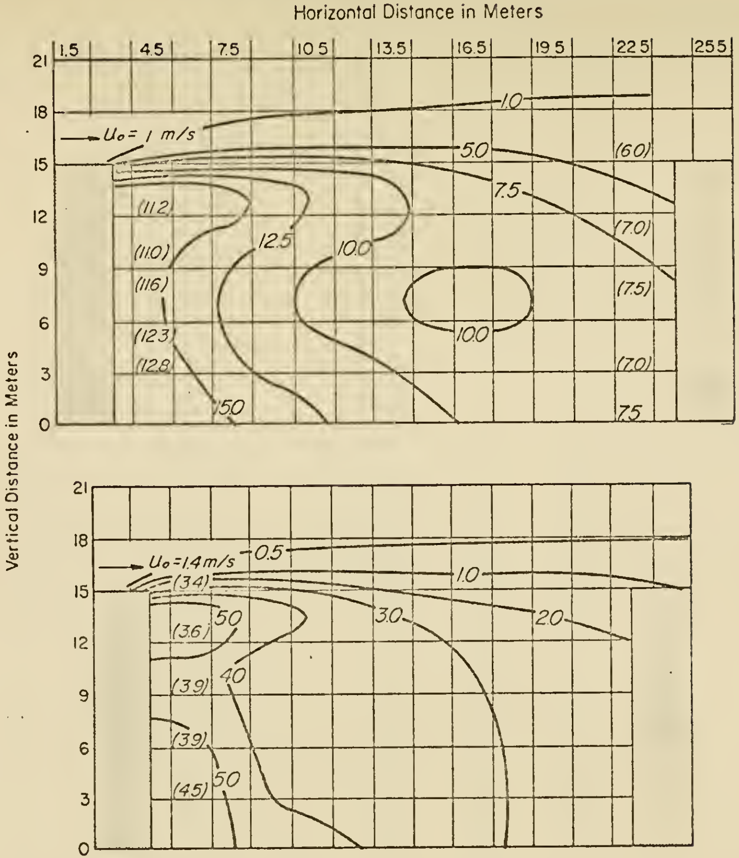

Figure D-7 Observed CO Concentrations for a Northerly Roof-top Wind of 1.4 m/sec in San Jose Field Experiment and Corresponding Concentration Field Predicted by CANYON Model

$$C = \frac{\sqrt{\frac{2}{\pi}}\, Q_A}{ua(1-b)} \left[x_2^{(1-b)} - x_1^{(1-b)}\right] \qquad \text{(D-3)}$$

where

C = the CO concentration at the receptor (mg/m^3),

Q_A = an area source emission rate (mg/m^2/sec),

a = 4.0 for neutral stability (m)*,

b = 0.256 for neutral stability (dimensionless)*,

u = the average wind speed (m/sec),

x_2 = distance from the beginning of the area source to the receptor (m),

x_1 = distance from the end of the area source to the receptor (m).

Q_A was computed for each line source emission strength, Q_L, and effective roadway width, δ, using the expression

$$Q_A = \frac{Q_L}{\delta} \qquad \text{(D-4)}$$

The effective roadway width, δ, was determined from the actual roadway width corrected to account for downwind spreading of emissions due to variations in wind direction within a 22.5° wind sector according to the equation

$$\delta = w + n\left(\frac{x_2 - x_1}{2}\right) \tan\frac{\theta}{2} \qquad \text{(D-5)}$$

where

w = street width (meters)

θ = 22.5°

n = number of obstructed boundaries parallel to flow for each line source,

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* Derived from: "Mathematical Approach to Estimating Highway Impact on Air Quality", Report No. FHWA-RD-72-37, Vol. (5).(35)

and x_1 and x_2 are defined as in Equation (D-3). This cross-wind spread correction was applied to emissions along Kneeland Street east of intersection #1 (see Figure B-4) with n = 1 to account for pollutant spread along the southerly side of Kneeland Street. The Summer Street parallel wind analyses assumed n = 2 along the entire roadway length.

D.4 Meteorological Assumptions Used in Modeling

The EGAMA, CANYON, and area source dispersion models require the specification of meteorological parameters for their air quality calculations. These parameters characterize the dispersive capacity of the atmosphere and have a fundamental effect on predicted air quality levels. This section documents the particular wind speed, wind direction, and atmospheric stability assumed in each analysis.

The San Jose field studies found little relation between atmospheric thermal stratification in the obstructed sublayer between the mean roof plane and street level and observed CO levels. This behavior may be attributed to the dominating effects of building-induced turbulence and the mechanical mixing resulting from vehicle motion when compared to mixing caused by convective processes. Other investigators (see, for example, McElroy(28) and Bowne(29)) have found that urban core areas do not exhibit the usual morning periods of stable stability due to the "urban heat island effect". As indicated in Section 1.5.2, these effects combine to produce neutral and unstable stability during the daylight hours in urban core areas.

A one-hour roof-top ($\approx$ 20 meters) wind speed of 2.0 m/sec has been assumed as a reasonable worst case sustained wind speed for the Boston core area in all EGAMA and CANYON modeling. For roof-top wind speeds below this value, the helical street canyon flow is probably not organized, with traffic-induced motions destroying the weak circulation that would exist at lower wind speeds. In fact, Georgii (1967) observed an increase in observed CO levels for winds between 1 and 2 m/sec (see Figure D-13). The two-dimensional wind tunnel experiments of Hoydysh, with no traffic-induced motions, did not observe this increase. An eight-hour average roof-top wind speed of 2.5 m/sec was assumed in all EGAMA and CANYON eight-hour modeling. This value was based on the second lowest wind speed with a duration, from the same 22.5° wind

sector, of eight or more hours observed at either of the two South Station monitors (4.7 mi/hr), scaled to the 20 meter roof-top level. Parallel wind analyses assume the wind speed noted above for each averaging period. These wind speeds, however, were assumed to represent the average wind speed in the obstructed sublayer.

An individual wind direction was determined for each alternative analyzed at cross sections #1 and #2. The direction chosen in each case was selected such that the wind vector was along the cross section (see Figures 4-1 through 4-3) and the roadway with larger source strength was on the leeward side of the street canyon to ensure that the worst case was considered. Cross sections #3 and #4 were modeled assuming a NNW and NW wind, respectively in all cases. The parallel wind analysis of Kneeland Street assumed a northwest wind. The same analvsis of Summer Street employed an east-southeast wind.

APPENDIX E

MEETINGS WITH TECHNICAL STAFF OF EPA - REGION I

The specific purpose of these meetings with EPA was to give the Region I Technical Staff input to the design of and approach to the South Station Air Quality Study.

Meeting No. 1

Date: August 9, 1974

Location: Region I Offices

Persons Present

John Calcagni	EPA
Norman Beloin	EPA
Elizabeth Levin	Metcalf and Eddy, Inc. (M&E)
Richard Mertens	Boston Redevelopment Authority (BRA)
Robert V. Bibbo	Environmental Research & Technology, Inc. (ERT)

Purpose of Meeting: To review with EPA ERT's proposed CO and meteorological measurement program in support of the South Station air quality impact study, and allow EPA to have an input to the program design.

ERT reviewed the rationale and purpose behind the proposed CO and meteorological measurement program. It was indicated to EPA that the program was being designed to monitor background CO levels in the project area. Background was defined as that CO level which was not unduly influenced by a particular source(s), and which would be added to model predictions to yield total ambient levels within the influence of a source(s). In this case it was clearly understood that source(s) were motor vehicular traffic utilizing project area roadways. At this time ERT indicated that the model to be used was ERT's numerical advection model, EGAMA. Since the program's objective was background monitoring, it was emphasized that monitor placement would be such that sufficient clearance from roadway traffic would be maintained to insure that the undue influence criteria of background monitoring was met. Several potential locations for monitor placement were indicated. In the northern portion of the project area, the Roselot Site was indicated as the primary site along with the Tracks Site as a first choise in the southern

portion. It was also indicated that the CO instrumentation to be used was an Intertech, an EPA reference method.

Mr. Calcagni indicated that he felt there were no problems with our proposed program, and did not offer any suggestions regarding the placement of the monitors. He said he understood our monitoring objective, and how we were planning to interface it with the EGAMA model predictions. Mr. Beloin, of the EPA Surveillance and Analysis Division indicated that he felt the monitoring program sounded fine on paper, but that either he or the Regional Meteorologist would like to conduct an onsite field investigation. ERT invited the EPA on a field trip to investigate the site, and indicated that the date of such a trip could be at EPA's convenience and discretion (see Meeting No. 3).

Meeting No. 2 Date: September 13, 1974
Location: Region I Offices

Persons Present

Wallace Woo	EPA
Donald White	EPA
Robert V. Bibbo	ERT
Elizabeth Levin	M&E
Gilbert Nelson	M&E
Richard Mertens	BRA
David Standley	Boston Air Pollution Control Commission

Purpose of Meeting: To review with EPA the Boston Transportation Control Plan (TCP) as it related to the South Station analysis.

The meeting was requested by M&E in response to a September 3, 1974 letter to Mr. Richard Ball from Mr. Bibbo of ERT, stating that ERT needed additional information and clarification. This letter is provided as Attachment #1 in this appendix. Mr. Woo reviewed the letter to Mr. Ball, and indicated that he would respond to the questions in the letter at a later date. The questions were subsequently answered in a letter to ERT signed by Mr. Calcagni. This letter is provided as Attachment #2.

Meeting No. 3
Date: September 25, 1975
Location: South Station Project Area

Persons Present:

Valentine J. Descamps	EPA Region I Meteorologist
Robert V. Bibbo	ERT
Ronald C. Hilfiker	ERT
Elizabeth Levin	M&E

Purpose of Meeting: Field Evaluation of the proposed ERT monitoring sites.

ERT took Mr. Descamps on a field tour of both proposed monitoring locations. The Roselot Site in the northern portion of the project area as well as the Tracks Site in the southern portion were visited. The ERT rationale and objective for background monitoring was discussed relative to both monitors, since Mr. Descamps did not attend meeting No. 1. Mr. Descamps did not question ERT's proposed monitoring locations nor did he offer any comments or suggestions, either verbal or written.

Meeting No. 4
Date: January 31, 1975
Location: Region 1 Offices

Persons Present:

John Calcagni	EPA
Wallace Woo	EPA
Robert V. Bibbo	ERT
Steven Penansky	ERT
Scott McCandless	ERT
Richard Mertens	BRA
Richard Ball	M&E
Gilbert Nelson	M&E
David Standley	Boston Air Pollution Control Commission

Purpose of Meeting: To review with EPA the locations ERT had selected for CO modeling.

ERT presented five cross sections to be evaluated with the EGAMA model. Mr. Calcagni said he "approved" of the modeling locations selected. Both Mr. Calcagni and Mr. Woo expressed concern that ERT did not plan to consider the area south of the project area in its modeling analyses. ERT indicated that based on traffic projections, the project would not have a significant or even a minimal impact in that area. Mr. Calcagni and Mr. Woo indicated that documentation of this fact should be included in ERT report since the area was highly sensitive.

In addition to the modeling locations selected, we also reviewed the EGAMA model, and its ability to simulate the complex geometries of the South Station area. Mr. Calcagni indicated that he was familiar with the model and realized its capabilities.

Attachment #1

ONMENTAL RESEARCH & TECHNOLOGY, INC.
), MASS • CHICAGO • LOS ANGELES • WASHINGTON, D.C.

REF: 074-009-ML-103 ERT Doc. No. P-1172

3 September 1974

Mr. Richard Ball
Metcalf and Eddy, Inc.
Statler Office Building
Boston, MA

Dear Dick:

Subject: Questions pertaining to the EPA Transportation Control Plan to Achieve Federal Air Quality Standards as it Pertains to the South Station Urban Renewal Project (SSURP)

To evaluate the SSURP as it affects air quality, it is necessary to evaluate and extract data from EPA transportation control plan (The Plan). The plan has been promulgated by the Federal EPA in order to reduce carbon monoxide, and hydrocarbon emissions to a point where CO and photochemical oxidant standards are attained in the Boston area.

Our review of the Plan, and available technical supportive material has raised some questions and technical details which need answering before we can continue with our analysis. This is most particularly true with respect to the manner in which the technical support document considers characteristic regional pollutant vehicle emission rates. Accurate regional emission rates are needed so that future air quality levels and conditions can be projected in future analysis years. The following needed information associated with the Plan needs clarification.

(1) Exactly what set of model year emission factors have been used. The technical support document is dated June 1973. Updated EPA vehicle emission factors have been published since this date. It would be beneficial to know if the Plan has been updated to reflect these changes.

(2) Does the Plan consider the interim federal vehicle emission standards. It is not apparent from the technical support document.

(3) In the calculation of the regional emission rates, what set of model year proportioning factors are valid in the Boston area. There seems to be three different sets used. These are one set for

(a) HC exhaust
(b) HC evaporative
(c) CO exhaust

It would also appear from the information available, that although the HC and CO exhaust proportioning factors are different, they are weighted with respect to annual miles traveled by model year, which the HC evaporative factors are not. This is confusing.

(4) Information of percent HDV, LDV and diesel VMT within the Core and Air Quality Control Region (AQCR). Present available information on this is unclear. (Table A-2 in Technical Support document.)

In addition to the above points, there are a couple of sets of data presented in the technical support document which also need clarification. These are:

(1) In Table III-7 there seems to be either a typo, or technical error in the representation of HDV evaporative emission factors. It would be beneficial to know exactly what the situation is.

(2) In Table III-4, there seems to be a large difference in the CO regional emission rate for the Core, and Boston. This could be due to adjustments for characteristic speed, but from available support material, this is not clear.

Clarification of the above points could be easily accomplished if a meeting with the appropriate regional EPA officials can be arranged. Therefore, it would be greatly appreciated if you or your staff could arrange this meeting as soon as possible.

Sincerely,

Robert V. Bibbo

Robert V. Bibbo

RVB:kjv

Attachment #2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203
Air and Water Programs Division
Air Branch

September 23, 1974

Mr. Robert Bibbo
Environmental Research and Technology
426 Marrett Road
Lexington, Massachusetts 02173

Dear Mr. Bibbo:

I am in receipt of your letter dated September 3, 1974, to Mr. Ball of Metcalf and Eddy, Inc. requesting additional information in regard to the EPA Transportation Plan. I hope this letter clarifys the points of confusion.

1. & 2. The model year emission factors used for the final report are identical to those published in AP 42, "Compilation of Air Pollutant Emission Factors", supplement 2, published in September 1973. These include the interim standards approved by EPA for carbon monoxide and hydrocarbons for 1975. The plan does not include the 1976 extension of the interim standards voted by Congress.

3. I've sent you under separate cover the actual vehicle registrations for Suffolk, Norfolk, Essex, and Middlesex County for July 1, 1971. The proportion factors presented for the exhaust emissions are simply a weighting fraction of the contribution of each model year to the emission load. This is not the same as the vehicle travel mix (M) for each year.

4. Table A-2 presents three lines for each zone. The first line is the total VMT for Light Duty Vehicles, Heavy Duty Vehicles, and Other Vehicles, respectively. The second line is the speed for each of four types of road--expressway, arterial, collector, and local. The third line is the fraction of travel in that zone for the four types of roads. That data should be adequate to attain the breakdowns necessary.

With regard to the other two points mentioned, you are correct in assuming that the column labeled "M" in Table III-7 is a typographical error. A set of data from an earlier report was inadvertently included erroneously. I would recommend that you divide the product by the emission factor in that table and compare that to the number derived using the registration date which I've mailed you. They should be consistent.

The 11 percent difference between the core and the East Boston emission rates is due to the speed adjustment factors as you speculated in your letter. I regret these ambiguities in the report were so troublesome. However, in all fairness, I wish to point out that the intent of the report was to illustrate the development of strategies and not specifically to illustrate the development of the emission inputs to our models. The use of the methodology presented in AP 42 second supplement will be consistent with that used in the plan development.

If any further problems should arise, please feel free to contact me directly.

Sincerely yours,

John Calcagni
Engineer
Air Engineering Section

cc: Richard Ball

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